THE MANKIND QUARTERLY

VOLUME XLIII No. 1 Fall 2002

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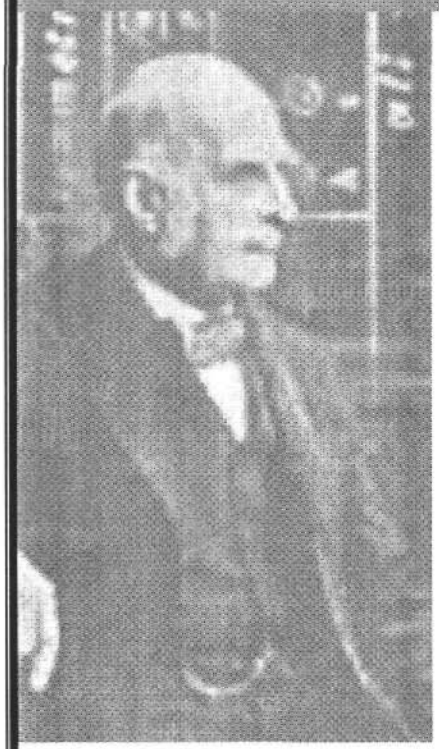

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CONTENTS

Aztec Cannibalism and Maize Consumption: The Serotonin Deficiency Link
Michele Ernandes, Rita Cedrini, Marco Giammanco, Maurizio La Guardia, and Andrea Milazzo.....3

Gender Roles, Traditions & Generations to Come: The Staffing of Social and Political Institutions
Wade C. Mackey and Ronald S. Immerman..... 41

The Intelligence Divide: A Contemplative Survey of Human History
Seymour W. Itzkoff..... 61

David Starr Jordan on the Dysgenic Effects of Dysfunctional Culture
Ian McNish. 81

A Comment on Richard Lynn's "Eugenics: A Reassessment" Reviewed by Kevin Lamb in Volume XLII, No. 2
Frank Ellis. 99

Will China Become the Next Hegemonic Superpower?
Richard Lynn..... 107

Intraspecific Variation in Gene Expression Patterns in the Brains of H. Sapiens: Implications of Padbo's Findings for Group Cognitive Differences
John Foster..... 111

Book Reviews: Biology at Work: Rethinking Sexual Equality..... 115

Cover Picture: Bas relief of Aztec worshipper, Teotihuacan. (See article: *Aztec Cannibalism and Maize Consumption: The Serotonin Deficiency Link*)

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Aztec Cannibalism and Maize Consumption: The Serotonin Deficiency Link

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In 1977 Michael Harner suggested that the Aztecs might have practiced cannibalism to obtain animal proteins. A year later, Bernard R. Ortiz de Montellano objected that the Aztecs could obtain all the required aminoacids from vegetable sources, and that their cannibalism was simply a thanksgiving ritual, because its occurrence generally coincided the maize harvest.

But at about the same time other researchers showed that maize consumption could provoke brain serotonin deficiency, which, in turn, could provoke some neurobehavioral after-effects, such as the tendency towards aggressive behavior or religious/ideological fanaticism.

In this study we attempt to show that a maize diet may cause serotonin deficiency and that this could explain cannibalism and other peculiarities of Aztec culture. The conclusions reached in this study are consistent with past and recent evidence of cannibalism among the Anasazi, a people that was similarly heavily dependent on maize for their nourishment. More broadly, our findings indicate a probable alimentary background for aggressive or fanatical behavior in populations heavily dependent on foods that can lower brain serotonin.

Key Words: serotonin; trp/LNAAs ratio; aggression; fanaticism; maize; Aztecs.

Introduction

Human Sacrifices among the Aztecs

The Aztec human sacrifice/cannibalism complex has been studied from various viewpoints, such as the religious, the social, the economic and the ecological, often in contrast to the exclusion of one another. But in our understanding of religious

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studies, these various interpretations are not necessarily mutually exclusive since – considering that they concern various levels of research – they can be complementary. We think, really, that religious phenomena, showing numerous aspects, may be studied at various levels: a first research level may regard the biological bases, neurological or ethological, of religious thought (Mandell 1980, Gazzaniga 1985, Burkert 1996, Ernandes and Giammanco 1998); a second level, phenomenologic-structural, the subordinate relationship of human beings to divine beings, the idea that the sacrifice is the main way to communicate with them (Hubert and Mauss 1898, van der Leew 1933, Widengren 1969, Burkert 1983, Carrasco 1995); a third, the relationships between social structures and peculiar shapes of credence and rituals (Durkheim 1912, and the sociological school); a fourth, the economic-ecological one, the material goods used for religious rituals (Firth 1971, Harris 1977, and cultural materialists; Winkelman 1998): goods for sacrifices are of course directed to gods, but they are then usually eaten by human beings. These four approaches can coexist and interact synchronically, and a fifth one may be added, the historical or diachronic aspect. Obviously, for a given religion, results of studies carried out on one level must be coherent with the results obtained for other levels, since a comprehensive study must be non-contradictory. Till now the tendency to favor a particular type of study in exclusion of any other has prevailed (Pals 1996). If this was reasonable in the past, as these various approaches were discovered little by little, it is less excusable now.

In this work we examine Aztec religion starting with the cultural materialistic and the neuro-biological aspect, which has been little studied as yet, while bearing in mind the other viewpoints with the aim of preparing the way for a multilevel synthesis.

In 1977 Harner suggested the Aztecs might have practiced cannibalism to obtain proteins containing all aminoacids in the proportions required by humans. In fact, Aztecs lacked herbivorous animals as a protein source. According to Harner, ancient hunters had completely killed off the big herbivores in the Mesoamerican area, and small game hunting did not meet the needs of the growing population. "In terms of carbohydrate production, this challenge was usually met by *chinampa*

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development and other forms of agricultural intensification; but domesticated animal production was limited by the lack of a suitable herbivore. This made the ecological situation of the Aztecs and their neighbors unique among the world's major civilizations" (1977a: 118-19). Chiarelli (1992) and Diamond (1997) have emphasized that, even had such animals not been hunted to extermination, the Mesoamerican area would have still lacked large herbivores suitable for domestication.

To capture the nearly 20,000 prisoners required yearly for sacrifices, the Aztecs waged annual wars (Harris 1977), enlarging their empire, but letting some independent enclaves or population survive and breed (fig. 1) to become the objects of subsequent "Flowery Wars" – wars aimed at capturing human meat for consumption.

Harner's hypothesis was overwhelmed with criticism (Price 1978, Sahlins 1978, Garn 1979, Conrad & Demarest 1984, Demarest 1984, Carrasco 1995). In his critical study, which proved to be very useful for the data reported, Ortiz de Montellano (1978) objected that the Aztecs could have obtained all aminoacids from vegetable foods, and that cannibalism, which was linked to the maize harvest, could be explained as a thanksgiving ritual rather than a nourishing need. It has actually been observed that the most manifest alimentary problems caused by maize – such as its deficiencies in niacin (the pellagra preventing vitamin), lysine and tryptophan – had been solved: niacin was preserved by a maize processing technique (Katz et al. 1974), and other foods (e.g. beans) could supply additional amounts of lysine and tryptophan. So the Aztecs, or other Mesoamerican peoples, did not suffer from pellagra or from aminoacidic deficiency in order of protein synthesis. Some years before Harner's and Ortiz de Montellano's studies, nevertheless, other researchers (such as Fernstrom & Wurtman 1971) had shown that maize consumption could provoke another deficiency more subtle than a simple aminoacid deficiency: that of serotonin which, at the same time, was being shown to be one of the most important brain neurotransmitters.

Serotonin Synthesis

Serotonin is synthesized by hydroxylation of tryptophan (*trp*) to 5-hydroxy-tryptophan by the specific enzyme *tryptophan hydroxylase* and the subsequent decarboxylation to 5-

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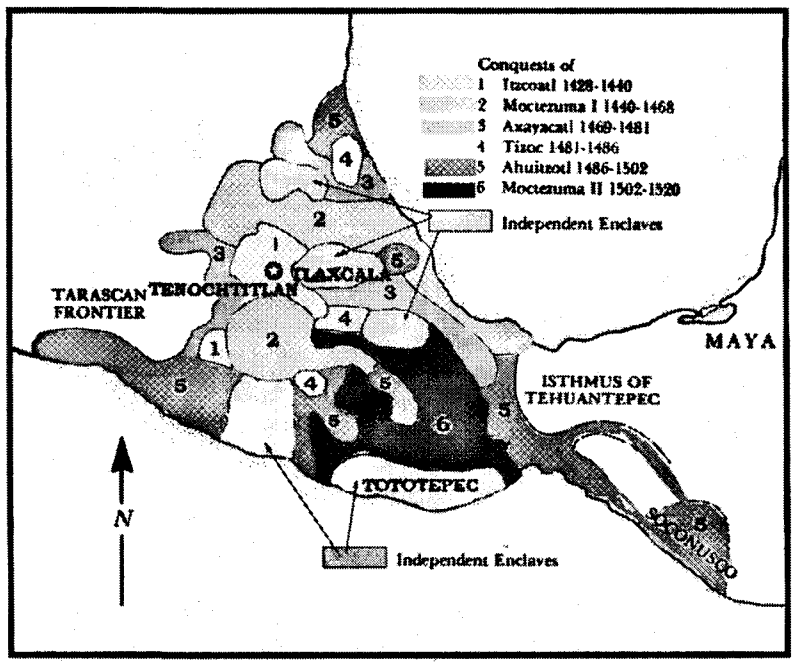

Fig. 1 The Aztec imperial expansion, showing the conquest from 1428 to 1520 (Mexica *tlatoani* Izcoatl - Moctezuma II).

From Conrad and Demarest 1984, following Barlow 1956, Krickeberg 1956, and Davies 1968.

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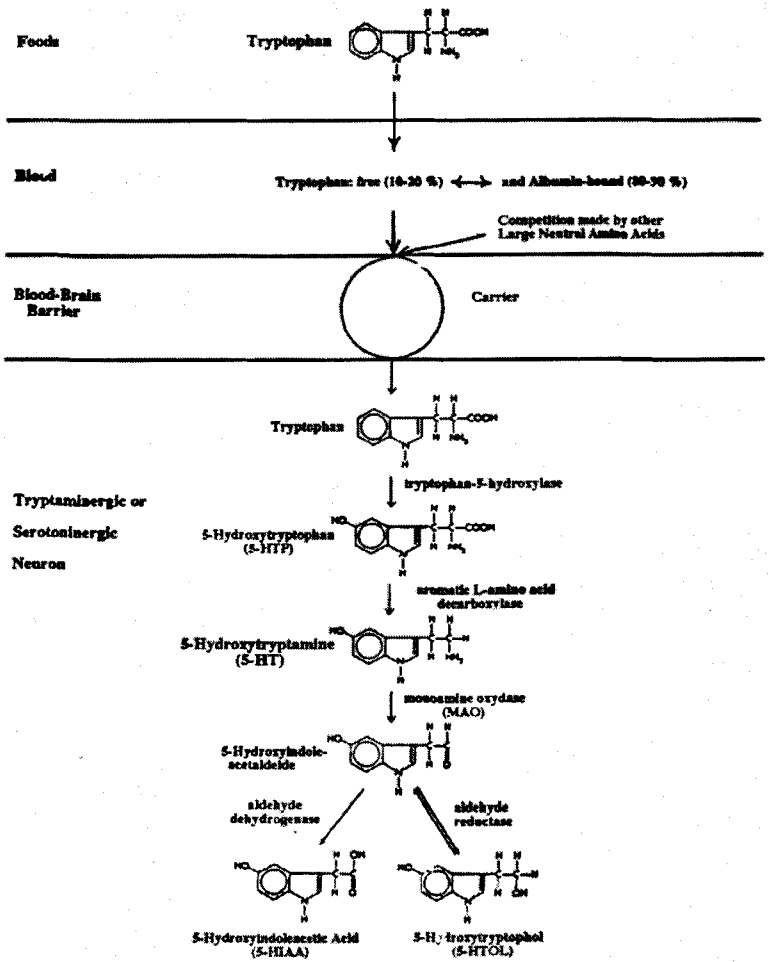

Fig. 2

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hydroxytryptamine (or 5-HT or serotonin) by the non-specific enzyme *aromatic aminoacid decarboxylase.* Under physiological conditions, tryptophan hydroxylase is not fully saturated with its substrate, so the 5-HT pathway, at least in the brain, can be influenced by substrate availability (Fernstrom 1983). It is also known that tryptophan is transported across the blood-brain barrier (BBB) by a carrier, which also transports several other large neutral aminoacids (LNAAs): isoleucine (*ile*), leucine (*leu*), phenylalanine (*phe*), tyrosine (*tyr*), valine (*val*), histidine (*his*) and methionine (*met*) (Lehnert & Wurtman 1993; fig. 2). Competition among these LNAAs can be observed and calculated at BBB level (Hargreavest & Pardridge 1988) but not in most other tissues, such as the liver, muscles and intestine. This is due to the fact that LNAA transport in those tissues is mediated by high K_m processes (Smith et al. 1987), so the effects of each dietary protein on the plasma aminoacid pattern tend to be correlated with its own aminoacid composition (Yokogoshi & Wurtman 1986), or, more precisely, with its digestible part (Sarwar & McDonough 1990), but other processes must be considered, mostly the hydroxylation of *phe* to *tyr*, due to *phenylalanine hydroxylase* in the liver: it accounts for approximately 75% of the disposal of *phe* (Erlandsen & Stevens-Raymond 1999), and is the most important transformation, as a result of which the plasma aminoacid composition that arrives in the liver is not the same that comes out from it and goes to brain capillaries.

Brain *trp* levels rise when either blood *trp* levels rise or blood levels of one or more of the other LNAA competitors fall (Fernstrom 1983).

Serotonin deficiency has been found to be caused by maize-based alimentation in rats. At the end of their article, Fernstrom & Wurtman wrote: "In certain societies, large numbers of people subsist on corn [maize] diets ... Our findings on rats raise the possibility that such diets might modify the functional activity of an important set of brain neurones in these people" (1971: 64).

Maize was firstly and largely utilized for human feeding by Mesoamerican peoples: it spontaneously suggests that the effects of Serotonin deficiency expressed by Fernstrom & Wurtman could have been present among Mesoamerican peoples. Among them we have focused our study on the Mexica, better known as Aztecs, because adequate documentation and evidence of their

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habits and behaviors exists. A number of preliminary studies and reports have been published by us since 1987 (Ernandes; Ernandes & Giammanco 1992; La Guardia, Ernandes 1994; Ernandes, La Guardia 1994; Ernandes, La Guardia & Giammanco 1996; Ernandes et al. 2000).

Among the Aztecs, serotonin deficiency could have been caused by competition of other LNAAs against tryptophan, as it has been above described. Furthermore it has been reported (Marx 1977) that Aztecs made idols out of a paste composed of ground and toasted amaranth seeds, and that these idols were eaten as a divine food having the same value as a human victim's flesh: if we examine the aminoacid composition of amaranth proteins (Sanchez-Marroquin et al. 1986; see Table I), we may note that they have a lot of tryptophan with a lower content of LNAAs competitors.

Analytical study

Availability of TRP for Serotonin Synthesis

In order to evaluate the availability of *trp* for serotonin synthesis, we must examine the ratios between *trp* and LNAAs in foods: the ratios may be given both in absolute values (R "regular", Rr) and in carrier-affinity related values (R "normalized", Rn), using the equation proposed by Hargreavest and Pardridge:

K_m normalized Trp ratio = [Trp] / Σ [LNAA]$_*K_m^{trp}/K_m^{LNAA}$,
where K_m^{trp} is the K_m of tryptophan, and K_m^{LNAA} is the K_m of concurrent aminoacid.

We have not determined the aminoacidic composition for human flesh, but Millward has written that the aminoacid composition of beef is "essentially the same as human skeletal muscle"(1999: 252) and has given its tryptophan content; Bier (1989) calculated other aminoacid contents. Integrating these data, we have estimated the composition of human flesh and have calculated R-values for it.

Values for Aztec (maize – human muscle) and non-Aztec foods (beef – corn flakes) are given in Table I, which also shows values for a quality protein maize (QPM) recently obtained from the hybridization of common maize and a mutant maize rich in lysine and tryptophan (as "opaque 2" maize). Table I shows Rn values without *phe* → *tyr* conversion and with the conversion of 75% of the disposal of *phe* to *tyr*. The table also shows the

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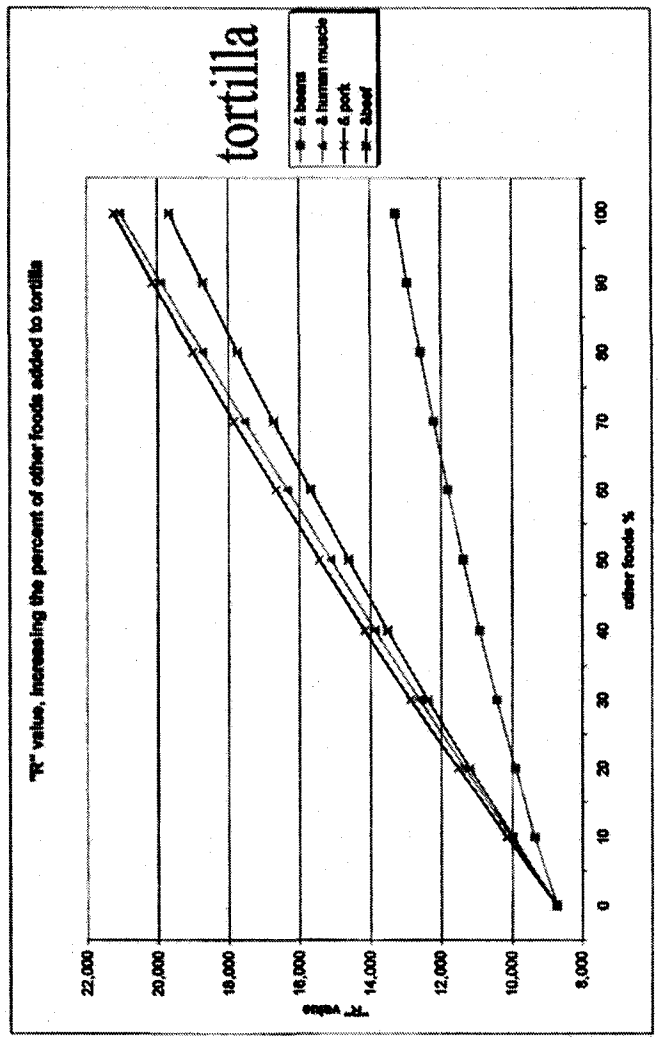

Fig. 3

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	K_m^W / K_m^{LNAA} (human) (rat)	Maize	Tortilla	Beans	Amaranth	Human muscle	Beef	Pork	Soft QPM	Corn Flakes
Trp (W)	1 (1)	2.451	2.451	5.293	6.863	6.372 [a]	6.462	6.907	4.902	3.428
Ile (I)	1.111 (0.27)	32.061	34.351	53.399	27.481	39 [b]	43.372	44.066	26.717	35.232
Leu (L)	0.909 (0.52)	93.130	73.282	80.995	38.931	61 [b]	67.661	66.621	66.412	132.387
Phe (F)	10 (1.36)	22.424	23.030	39.835	36.364 (F+Y)[a]	27.5 [b]	29.201	26.997	24.848	36.448
Tyr (Y)	2.308 (0.23)	20.994	20.994	25.160		19 [b]	22.350	22.853	20.442	20.863
Val (V)	0.341 (0.07)	38.461	41.026	65.407	35.897	47 [b]	51.282	55.167	45.299	52.597
Met (M)	0.588 (0.37)	12.752	12.752	8.193		18 [b]	19.829	21.964	12.08	15.957
His (H)	0.588 (0.15)	17.419	15.484	21.203		[29] [c]	24.926	29.032	23.226	21.655
Sources	Human: 1 rat: 2	3	3	4	5 a: source gives F+Y in g/16gN; converting in mmol g prot. we use pm of F	a: 6; b. 7 c: as pork	4	4	3	4
Rr (x 1000)		10.33	11.09	17.99		26.49	24.99	25.90	22.38	10.88
Rn (x 1000)		5.78	5.92	8.41		13.81	13.31	14.36	11.62	5.6
Rn (x 1000) (25% Phe)		**8.32**	**8.71**	**13.26**		**21.05**	**19.66**	**21.23**	**17.60**	**8.53**

Sources. 1) Hargreawest & Partridge 1988. 2)Smith et al. 1987. 3) FAO 1992. 4) Belitz 1993. 5) Sanchez-Marroquin et al. 1986. 6) Millward 1998. 7) Bier 1989.

Table I

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differences between human and rat carrier–affinity of the concurrent aminoacids: some differences are notable, especially for *phe.*

For each diet or for each meal consisting of two or more foods the ratio can be calculated using the following equation:

$R = (a W_a + b W_b + ... + n W_n) / (a \Sigma_a + b \Sigma_b + ... + n \Sigma_n)$,

in which:

I. a, b, ... , n are the grams of protein contained in foods A, B, ... , N respectively (i.e. the percentages of proteins that they provide compared to the total amount of proteins in the meal or in the diet);

II. W_a , W_b , ... , W_n are the quantities of tryptophan, in mmol/g prot., contained in foods A, B, ..., N;

III. Σ_a , Σ_b , ..., Σ_n are the sums of the quantities, in mmol/g prot., of the concurrent aminoacids contained in foods A, B, ... , N.

W and S may be in absolute values for Rr, or affinity related, for Rn.

Figure 3 shows the curves of Rn (25% *phe*) values for meals consisting of tortilla (maize), beans and human muscle (Aztec foods), beef and pork (non-Aztec foods). The Trp/LNAAs ratio value is low both for tortilla and for beans, and it persists between these two values for every tortilla-beans dietary association. Presumably, after its harvest maize became the main dietary food, with the consequent reduction of trp/LNAAs ratio and of 5-HT synthesis, and beans could not counterbalance this reduction. Instead, tortilla associated with foods like human muscle allows, for the same percentages of maize proteins, the achievement of higher R-values; the same result can be obtained by maize-meat association, but Aztecs lacked large herbivores or a sufficient number of them.

Data shown in Table I and in Fig. 3 suggest that serotonin deficiency, caused by low R values, might be greater when:

a) feeding depended mainly on maize, and
b) other foods were not widely available which, having a high R-value (as amaranth), permitted an increase of serotonin synthesis.

Correspondence between Agricultural Cycle and Ritual Ceremonies.

Table II shows the relation between agricultural cycle and Aztec rituals: ceremonies, according to Krickeberg (1959) were

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celebrated in the last days of the Aztec months whereas the agricultural activities could start at the initial days. From the historical and ethnographical data of this table it appears that:

a) Cannibalism was certainly practiced in periods following the maize harvest (the Aztec months of *Tepeilhuitl* and *Panquetzaliztli*);
b) "During the month [of *Quecholli*] a very large wild game hunt was conducted, and at its conclusion many captives were sacrificed and eaten" (Ortiz de M. 1978: 615);
c) Cannibalism decreased, or ceased, when amaranth based foods were eaten (*Atemoztli* and *Izcalli*);
d) Human sacrifices, without or with very little cannibalism, were made in the second half of the dry season, before maize planting.

In the Aztec year we may note, with regards to maize availability, the following three periods:

1. high availability, from the 13th to the 18th month (six months);
2. medium to low availability, from the 1st to the 4th month (four months);
3. low to very low availability, from the 5th to the 12th month (eight months).

Table II shows that the three most important cannibalistic rituals occurred in the high corn availability period (comprising six Aztec months, or 1/3 of the year). The probability of each of them occurring by chance in such a period is 1/3; the probability that all three might occur by chance in such a period is $1/3 \times 1/3 \times 1/3 = 1/27$, or $p = 0.037$ (a figure which is statistically significant since $p < 0.05$).

In three of the six Aztec months cited above, amaranth was also available and was certainly eaten (*Atemoztli, Tititl* and *Izcalli*), while in the other three either there was no amaranth available (*Tepeilhuitl* and *Quecholli*) or there was no certainty that it was eaten (*Panquetzaliztli*).

Cannibalistic rituals occurred exactly in these last three Aztec months: the probability that all three occurred by chance in such period is: $1/6 \times 1/6 \times 1/6 = 1/216$ ($p = 0.0046$, a high significant value, since $p < 0.01$).

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Comparative and Neurobiological Studies

Aztec Cannibalistic Rituals

According to Ortiz de Montellano, because of the precise correspondence between cannibalism and maize consumption, Aztec human sacrifices and cannibalism might be "better explained as a thanksgiving rather than a nourishing need" (1978: 611). Nevertheless, the Aztecs did not regard their sacrifices as simple "thanksgivings": they considered themselves as invested with the divine mission of fortifying the sun in its struggle with the darkness: "Convinced that in order to avoid the final cataclysm it was necessary to fortify the sun, they undertook for themselves the mission of furnishing it with the vital energy found only in the precious liquid which keeps man alive" (Leòn-Portilla 1963). At a conscious level, the Aztecs justified their sacrificial rituals as necessary for mantaining the cosmic order and for allowing the relations between human and divine beings. Indeed, as noted by Ortiz de Montellano himself, "Sacrificial victims were believed to have become sacred. Eating their flesh was the act of eating the god itself. This communion with superior beings was an important aspect of Aztec religion. ... Communion, in conjunction with a belief in the real presence (which some Christian religions practice), is not different in symbolism to the actions of the Aztecs in consuming what they considered to be the flesh of the gods" (1978: 615). So, Ortiz de Montellano intended to reconfirm the merely religious explanation of Aztec cannibalism, until then prevailing among scholars (for example: Vaillant 1941, Caso 1953, Krickeberg 1956, Lopez-Portillo 1977). These religious explanations are true: the Aztec human sacrifices were religious sacrifices according to the criteria of Hubert and Mauss (1898), but, as noted by Winkelman, religious explanations alone are "uninformative. Religious justifications for human sacrifice and cannibalism do not alone explain such beliefs and behavior. ... (Aztec) beliefs may explain their behavior, but leave unanswered the question of why the beliefs and practices were adopted, and fail to identify the psychosocial functions of human sacrifice" (1998: 286-7).

Another consideration may be further given: if in a given religion the main rite consists of the sacrifice of men who "impersonate" gods, it does not seem essential that there should be thousands of them or even that they should be men at all: the

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TABLE II: Aztec Calendar, agricultural cycle and ritual ceremonies*. Data from Ortiz de Montellano and others.

Aztec month	Christian Calendar	Agricultural cycle		Ritual ceremonies
		Dry season		
1 *Atlcahualo*	02/14 to 03/05			*Children sacrificed to Tlaloc*
2 *Tlacaxipehualiztli*	03/06 to 03/25			*Big kill (Skinning of men and gladiatorial sacrifice for Xipe Totec ‡)*
3 *Tozoztontli*	03/26 to 04/14			*Children to Tlaloc*
4 *Huey tozoztli*	04/15 to 05/04			*Children to Tlaloc*
		Rainy season		
5 Toxcatl	05/05 to 05/24	**Planting of corn**		Eating of victims possible
6 Etzalcualiztli	05/25 to 06/13			but not mentioned
7 Tecuilhuitontli	06/14 to 07/03			
8 Huey tecuilhuitl	07/04 to 07/23	*Time of scarcity*		
9 Miccailhuitl	07/24 to 08/12			
10 Xocotlhuetzi	08/13 to 09/01	*Fruit harvest*		No killing, no victims eaten.
11 Ochpaniztli	09/02 to 09/21			Harvest feast (*Woman sacrificed ‡‡*)
12 Teotleco	09/22 to 10/11			
13 Tepeilhuitl	10/12 to 10/31	**Corn harvest**		Big kill and eating.
14 Quecholli	11/01 to 11/20			Large wild game hunt and captives sacrificed and eaten.#
		Dry Season		
15 Panquetzaliztli	11/12 to 12/10 ##	**Corn harvest**		Biggest kill and eating.
16 Atemoztli	12/11 to 12/30 ##			No victims eaten. *Eating of amaranth idols.* ##
17 Tititl	12/31 to 01/19			Eating of victims possible but not mentioned.
18 Izcalli	01/20 to 02/08			No victims eaten. *Eating of amaranth dishes.* ##
(Nemontemi)	02/09 to 02/13			

* Ritual ceremonies were celebrated at the end of aztec month (Krickeberg 1959).
‡ Hassig 1988.
‡‡ Brown 1984.
# Datum from Ortiz de Montellano's article (1978), but not in its table.
Amaranth harvest or eating (Martinez 1936).

Aztec months 1, 2, 3 and 4: *from medium to low corn availability.*
Aztec months 5, 6, 7, 8, 9, 10, 11 and 12: from low to very low corn availability.
Aztec months 13, 14, and 15: high corn availability.
Aztec months 16, 17, and 18: high corn availability, but eating of amaranth.

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Aztecs knew this very well, which is proven by the fact that they also consumed idols made of amaranth, "a practice that the Spanish conquistadors considered a perverse parody of the catholic Eucharist" (Marx 1977: 40). Astonishingly (for Catholic priests), the Aztecs had the concept of transubstantiation! The structural likeness between Aztec religion and Catholic doctrine had been noticed by some scholars such as Las Casas or Duràn, as referenced by Ortiz de Montellano or Todorov (1999). Using Faherty's (1976) classification of sacrifices, we may say that the sacrifice of Christ is for expiation (of sin) and communion, Aztec human sacrifices were of communion (if cannibalistic), of propitiation (children for Tlaloc), of fertility (skinning of men for Xipe Totec, of women for Toci), whereas sin expiation was committed to personal penance. The parallels between Mesoamerican human sacrifice and Christian sacrifice is plain from their artistic representations, as in figures 4 and 5.

If human sacrifice had a purely religious significance, the Aztecs would have had no need to sacrifice thousands of men every year: a few would have sufficed, and even none at all, if the human victims had been replaced by the effigies of idols "transubstantiated" into gods. Instead, they had to capture thousands of enemies, and to wage wars to meet this need that lowered the efficiency of their army: according to Price (1978: 109) "A soldier could probably have killed three of the enemy in the time required to take one prisoner." Moreover, if regular warfare prisoners were insufficient, they made wars against independent enclaves (as Tlaxcala; see fig. 1): these were called "Flowery Wars", "fought on a pre-arranged battlefield whose sole purpose was to capture offering for warrior sacrifices" (Read 1998: 201). To think that the Aztecs might have fought so hard to capture thousands of victims for a simple thanksgiving to the gods is no compliment to Aztec intelligence.

Vice versa, the observations that (see table II):

I. all the cannibalistic rites were made after maize consumption;
II. maize-based feeding causes serotonin deficiency,
III. maize-human flesh association raises trp/LNAAs ratio value

support the hypothesis that cannibalism could help promote 5-HT synthesis. It also coincides with the absence of cannibalism when amaranth meals were eaten, since amaranth has a high

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tryptophan content and high trp/LNAAs ratio value. In addition, eating amaranth enabled the Aztecs to concentrate their human flesh consumption in a brief period of time, thus maximizing the "prisoners' availability/consumers" ratio. Human flesh or amaranth consumption during periods when maize was widely obtainable is in agreement with the principles of homeostatic regulation, for which "a nutritionally unbalanced diet may lead to neurochemical processes that now induce the intake of another differently composed meal" (Lehnert & Wurtman 1993: 19).

Nevertheless, we cannot maintain that cannibalism or amaranth consumption entirely resolved the serotonin deficiency problem, but that at the most they mitigated it in periods when it became more grievous. We must also consider that the entire development of an Aztecs' nervous system occurred in the presence of a tryptophan deficiency during fetal development, during breast-feeding (it has been shown that milk of maize-nourished mothers is *trp* deficient, J. J. Wurtman & Fernstrom 1979), and in infancy, when maize and beans were the main foods.

Serotonin and Behaviour:

Serotonin deficiency involves several consequences such as the tendency towards *aggressive behaviour, an increase of intraspecific competition, an increase of magic thought and religious fanaticism, temporal lobe epilepsy, and an attraction to fire.*

a) *Aggressive behaviour:* in rats, serotonin deficiency may be caused by maize-based alimentation (Fernstrom & Wurtman 1971; Fernstrom & Lytle 1976), and it induces the animals, mostly males, to kill mice (Giammanco et al. 1990).

b) *Increase of intraspecific competition or intraspecific aggression:* several researchers have shown that an increase in intraspecific competition is positively correlated with a decrease in serotonergic tone (Dougherty et al. 1999), as previous researches had shown in non-human primates (Raleigh et al. 1991, Mehlman et al. 1994), and in man: "countries above the median in corn consumption have significantly higher homicide rates than countries below the median in corn consumption" (Mawson & Jacobs 1978: 227). "Low CSF 5-HIAA concentration is

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primarly associated with impulsivity, and [low 5-HIAA conc. and] high CSF testosterone concentration with aggressiveness or interpersonal violence" (Virkkunen et al. 1994); "trp depletion increases aggressive responding in healthy males in a laboratory setting" (Moeller et al. 1996: 97). It is therefore reasonable that Aztecs might have used warfare to obtain victims for their sacrifices, giving vent at the same time to their aggressive impulses outside their own society.

c) *Magic thought and accentuated religious fanaticism.* Mandell (1980) observed that there is a positive correlation between mystic feelings and serotonin deficiency, and Rapoport (1989) reported that the obsessive-compulsive disorder (OCD, having many similarities to religious fanaticism) is attributable to disturbances in serotonergic transmission. Dulaney and Fiske (1994) have suggested that psycho-physiological mechanisms similar to those affecting OCD patients underlie cultural rituals. Serotonin deficiency, after all, promotes magic thought and mythopoiesis. Substances like LSD, which interferes with serotonin, can provoke hallucinations very similar to the states of ecstasy described by mystics. In view of their low serotonergic tone, the Aztecs must have been very sensitive to drugs interfering with serotonin, as LSD, mescalin, and psilocybin, that they assumed consuming vegetables containing them (*Rivea corymbosa, Lophophora williamsii*, or peyote, and the mushroom *Psilocybe mexicana*). They were probably aware of their dangerous nature, as their consumption was subject to the priests' strict control. Some sources (e. g. Hernandez 1651) say that priests consumed these plants and had various visions, often nightmarish, of their gods: this is probably the origin of the horrific character of most of the Aztec divinities (fig. 6). This mention of hallucinatory sensations suggests an intriguing note: the most venerated divinities were the four Tezcatlipocas: the "Red" or Xipe Totec (*Our Skinned Lord*), the "Azure" or Huitzilopochtli (*Hummingbird on the Left*), the "White" or Quetzalcoatl (*Feathered Snake*), and the

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"Black" or Yaotl (*the Enemy*) or Tezcatlipoca by antonomasia. It is interesting that the name Tezcatlipoca means *Smoking Mirror*, with "smoking" actually meaning "talking", because the glyph for "smoke" was used for "talking", as it is used in current comic strips (Campione 1992; in semiotics it is a "semantic dislocation of the symbol"; see also fig. 4: the sacrificator warrior is talking). So the true sense of "Tezcatlipoca" was "*Talking Mirror*": it is possible that priests might have the sensation that such deities talked to them from their mirrored images.

d) *Cruelty of rites.* As serotonin is one of the principal neurotransmitters of the Limbic System, which is in relationship with the prefrontal cortex (which, according to MacLean's triune concept of the brain (1973; see below, § *Neurobiology of religion*), helps us to see deeply into other people's feelings, as recent experiments have confirmed, (Stuss et al. 2001), its deficiency damages the function of prefrontal cortex and so it reduces the capacity of identification with other people's suffering. The importance of serotonergic transmission in the frontal cortex is also corroborated by the finding that 5-HIAA concentration in it correlated positively with 5-HIAA concentration in CSF (see above point "b").

e) *Temporal lobe epilepsy.* This is linked with the reduction of serotonergic tone (Mandell 1980), and causes feelings such as *dejà-vu*, cosmic visions, and dream states. According to Gazzaniga (1985), in its basic form it causes an intensification of religious beliefs and eccentric sexual behavior, although not necessarily together. In contemporary USA, in some clinical cases in which such "temporal lobe syndrome" assumes a chronic disease aspect, religious conviction increases and assumes an erratic form: the suffering subject passes from one belief to another, rapidly and without a manifest reason.

Aztec religiousness showed similar aspects: the Aztecs acquired from neighboring peoples some gods, myths and ritual ceremonies for their cult.

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Such contributions did not damage the basic principles of Aztec religion, because peoples from whom they originated professed the same religious principles: so these contributions were only "variations on a theme". However, a plethora of gods occurred, and a religious reformer, Tlacaelel (1424 ca.), arranged it, elaborating a system in which different gods were regarded as different aspects of the same god, or that a god had different hypostases. For example, Quetzalcoatl could become Ehécatl (god of wind), Tlahuizcalpantecuhtli (a war god, personification of Venus planet as morning star), or Xolotl (the dog god, Venus as evening star). So a complex and variegated religious system arose, one that might absorb very different contributions, so much so that such a scholar as Kirchoff said he was unable to understand Mesoamerican religion until he realized that "every personage was also his own grandmother" (quoted by Sodi 1980: 39).

f) *Cult or attraction for fire.* Low serotonergic tone has been observed in arsonists (Virkkunen et al. 1994); fire is present in a large number of religions where it assumes the magic and symbolic value of purification or of a punitive agent, or as a symbol of life: for example, Roman vestals attended to keep fire in Vesta's temple always alight; at the present time, fire is often used in fanatical and/or political demonstrations; fire rituals were very important in the Aztec religion (Read 1998).

g) It may be opportune to specify that serotonin deficiency doesn't cause, *per se*, mental deficiency. For example, the famous Doctor Johnson was OCD affected (Rapoport 1989), as also, from the symptoms and habits described in his biographies, was Kant; serotonin deficiency may possibly have afflicted philosophers such as Pascal, or men of letters such as Manzoni, Gogol or Dostoevsky. Indeed, serotonin deficiency seems to promote mental associative processes among ideas or concepts: this often leads towards magic mystical or mythopoietic thought, or helps some individuals to

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achieve high artistic or narrative abilities, often with a strong persuasive capability.

Non Cannibalistic Rituals.

Table II shows that Aztecs practiced some other rites with human sacrifices: among them the most important were gladiatorial sacrifices, skinning of men for Xipe Totec, and the offering of children plunged in mountain lakes, after plugging their respiratory tracts by resin, to the rain god Tlaloc. In gladiatorial sacrifice (unlike ancient Rome's gladiatorial games) a bound victim confronted opponents armed with blunt weapons (fig. 7, Hassig 1988). This kind of sacrifice supports Burkert's reconstruction of the origins of animal sacrifices as a ritualistic rendering of the hunt after the beginnings of agriculture (1983). In the Aztec case, the "prey" was a hostile warrior. Men skinning, with priests clothing themselves with the victim's skin, in the *Tlacaxipehualiztli* month, might symbolize the spring awakening of nature. Instead, the sacrifice of children to Tlaloc was propitiatory for rain and did not involve cannibalism: it had its Eastern Mediterranean equivalent, for different motives, in the holocaust, in which the victim was completely buried on the altar, or in the *moloch* (the children sacrifice practiced by the Phoenicians). Its animal model may be founded in pup killing by a dominant male that takes the place of another male in a harem, and it happens in various mammalian species, but, according to MacLean's triune brain model, it is a behavior that arises from the Protoreptilian brain (see below, § *Neurobiology of religion*).

Clearly the serotonergic system's activity is not steady, but fluctuates physiologically in the various brain regions in relation to environmental stimuli and to the action of other neuromodulators or neurotransmitters as dopamine or noradrenaline. A steady lowering in the serotonergic tone in one or more brain regions may be due to genetic imperfections affecting 5-HT receptors, the reuptake system, or serotonin synthesis ' enzymes; another kind of serotonin deficiency may derive from foods, as we are showing for maize. Moreover, foods can change serotonergic tone indirectly if, because of their composition, they affect dopaminergic or noradrenergic systems' activities. Really, precursor dependency of catecholamines (dopamine and noradrenaline) in the brain is coupled to the firing rate of the tyrosine hydroxylase containing

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neurons (Lehnert & Wurtman 1993). So, foods rich in their precursor (*tyr*, that in the liver can be also obtained from *phe*) can provoke, in stressing situations, an excessive catecholaminergic tone: this, in turn, lowers serotonergic activity, particularly if serotonergic tone is barely sufficient. Vegetable proteins often are rich in *phe* or *tyr* and poor in *trp*, so vegetable based diets, in stressing situations, may cause the appearance of behaviors typical of serotonin deficiency. This problem has not yet been studied at population level. An observation of Winkelman is of interest: "the absence of all sacrifice only in hunting and gathering societies; human sacrifice found in complex rather than simple agricultural societies, but not in pastoral societies" (1998: 293). This is in agreement with what we have shown: hunting and gathering societies have foods with a high R value, agricultural ones have foods with a low R value or with high tyrosine or phenylalanine content. These are dietary situations that, directly or indirectly, continuously or discontinuously, can lead to serotonin deficiency.

Neurobiology of Religion

According to MacLean's triune concept of the brain, the human brain is thought to be formed by three principal phylogenetic structures that have been superimposed and that have become integrated during evolution: the Protoreptilian brain or R-complex, the Paleomammalian, or Limbic System, and the Neomammalian. The R-complex, consisting of the upper spinal cord and parts of the midbrain, the diencephalon and the basal ganglia, "is fundamental for genetically constituted forms of behavior as selecting homesites, establishing territory, engaging in various types of display, hunting, homing, mating, breeding, imprinting, forming social hierarchies, and selecting leaders" (MacLean 1973a: 8). The Limbic System, formed by the olfactory bulb, septum, fornix, hippocampus, amygdala and cingulate gyrus, is regulator of the R-complex; it is also the principal seat of emotions and feelings: "it seems that <it> provides the ingredients for the strong affective feeling or conviction that we attach to our beliefs, regardless of whether they are true or false!" (MacLean 1973b: 123). The Neomammalian brain, consisting of the Neocortex and connected brainstem structures, is, at human level, the seat of self-consciousness, language, space and time conceptions,

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constancy, and of connections of causality. Also the R-complex has a capacity of fixing connections among phenomena, but these connections are not rational but rather temporal (*post hoc → propter hoc*): this leads to routine activities, ritualistic behaviors or, as evident in human beings, to obsessions and compulsions (magical thought).

According to MacLean the three basic brains show great differences in structure and chemistry, but they must intermesh and function together as a *triune* brain. The anatomical and functional structure that mainly allows the three brains to function in an integrated and coordinated way is the serotonergic system. Disturbances in this system can cause the appearance of peculiar reptilian displays (i. e. higher rates of aggressiveness, or magical thought, as in OCD), limbic disorders (i.e. temporal epilepsy, mysticism) or neocortical disorders (i. e. inability to see deeply into other people's feelings: according to Winkelman (2000) the frontal cortex renders conscious processes that are automatized in the R-complex or in the Limbic system.). With regards to the conception that human beings may have of gods, it has been observed that from the R-complex there arises the first and basic "*imago dei*" (Ashbrook & Albright 1997), an "Immense Power Being" (Ernandes & Giammanco 1998) with an absolute will, intolerant and cruel, to whom sacrificial victims must be offered; from the Limbic System there arises the mystical conception of near man deity, often like a solicitous father or mother, or a sympathetic brother, close to a human being's feelings and in communion with him (d 'Aquili and Newberg 1999, 2001, have studied particularly this deity conception); the human Neocortex elaborates the "Perfect Being" idea, which is more philosophical than religious.

In monotheistic religions all of these characteristics are combined into one God, with one characteristic prevailing over the others. The Aztec religion had a very crowded pantheon, with gods then showing extremely various characteristics: this may suggest that a lack of integration among the three fundamental brains, due to serotonin deficiency, allowed each of them to produce, somewhat independently, gods with their own peculiarities. The rain god Tlaloc (to whom children were sacrificed) may be considered *purely reptilian*; the black Tezcatlipoca, god of discord, and Xipe-Totec seem to have been

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mainly reptilian but with some limbic components; *limbic* characteristics may be seen in Huitzilopochtli (the god with whom communion might be established through cannibalism), and even more so in Quetzalcoatl (perhaps also neocortical), god of self-sacrifice and sacerdotal knowledge, who promoted to form the present type of human beings, the ones that subsist on maize; Ometeotl, supreme dual god, was typical of Neocortex: he could be only cogitated (by affluent classes members), and no popular cult was reserved to him (Caso 1953). These relations between triune brain and gods are summarized in fig. 10.

Imprinting-like Conditioned Behaviors

In the preceding section we stated that R-complex is the seat of *imprinting*. This consists in "a precocious learning in a sensitive stage", and differs from common learning because it always occurs in a fixed and critical period, outside of which it cannot any more occur, and the learning, or the behavior, so acquired not only persists throughout life, but has priority over similar learning or behaviors: "imprinting" is irreversible (Heymer 1977). This is necessary because by imprinting an animal learns which group is its own, i.e. it learns its own *species identity*. In Man, there is no definitive evidence of imprinting as it occurs in several animal species, particularly in those in which R-complex dominates, as in birds. However, young Aztec boys were collectively trained by priests to become warriors chosen for the mission of capturing enemy warriors to be sacrificed, or to face themselves the prospect of becoming a sacrifice in the enemy's temples.

Other populations in central Mexico also behaved and thought in the same way. According to Vaillant (1941), Tlahuicotl, a Tlaxcalan warrior taken prisoner and subjected to gladiatorial sacrifice, overcame the trial: so he saved his life and held a high rank in the Aztec army, but he could not win his conviction of being fated to die on the altar and, after a few war expeditions, he asked for the honor and glory of "flowery death".

Looking at other societies in the world, it appears that initiatory or passage rites occur in critical ages of individual development with emotional involvement: the Limbic System provides the strong affective feeling of conviction attached to the event, while the R-complex, as the seat of "imprinting",

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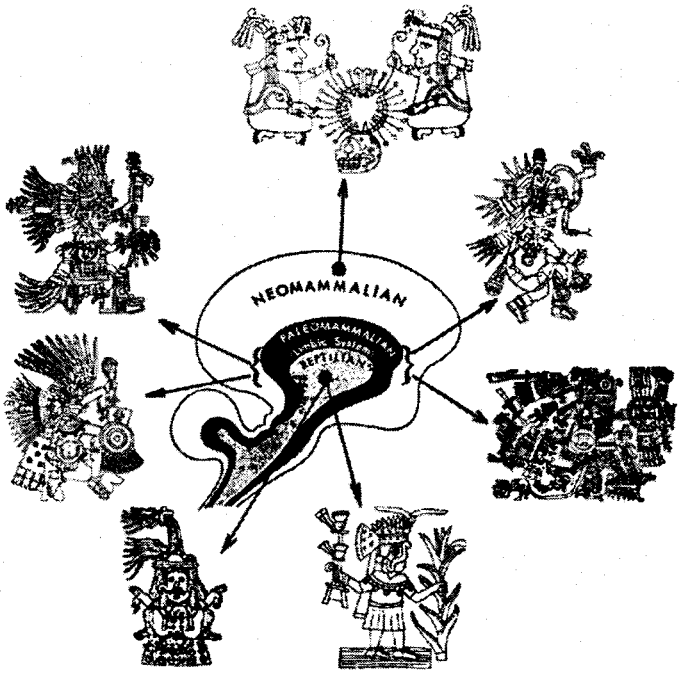

Fig. 4. From top, clockwise: ***Ometeotl***, ***Quetzalcoatl***, the black ***Tezcatlipoca***, ***Tlaloc***, ***Toci*** (to whom a woman was sacrificed by skinning in *Ochpaniztli* month), ***Xipe Totec***, and ***Huitzilopochtli***.

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makes firm the conditioning or acquired behavior. In today's industrial societies "passage rites" are less manifest or involving; in more or less attenuated forms they persist in particular communities, such as boarding schools or military colleges, where they occur to mould the "*esprit de corps*", or the team spirit. Another example of "imprinting-like conditioned behavior" may occurs in sports enthusiasts who, in a critical moment of their lives and owing to an emotional involvement, become the devotees of a particular sports team. Totalitarian regimes, even before the significance of imprinting was scientifically established, always took care of the education of youths and of propaganda: in an empirical way, by ritual, repeated, solemn and involving ceremonies, they have often achieved the result of inculcating "imprinting-like behaviors" on their peoples. Individuals that are "imprinted" to the same ideology, or leader, or religion, acquire the same "group identity": they may consider themselves the "chosen people", while the "others" may be considered "infidels", "heretics", "inferior beings", "not entirely human", enemies that can be killed without any hesitation or remorse.

Could "imprinting like behaviors", strong convictions, or deeply rooted ideologies, be changed? Humans have a developed Limbic System, whose normal activities are 1) control (mostly inhibitory) of the R-complex, and 2) to be the seat of emotions and affective feelings; but we have shown that, when its usual activity is disrupted by chronic epileptic seizures, it produces, or allows, the change from one belief to another. It seems that limbic epilepsy "cleans" the existing conviction and prepares the establishment of another one, accompanying it with new and strong feelings. In chronic limbic epilepsy this happens continually. In subjects who are not chronic epileptic, but that have a low excitement threshold, or that are in a strongly emotional or stressing situation, an acute limbic epilepsy attack can provoke the "cleaning" of an imprinting-like behavior, or of a deeply rooted ideology, and its substitution by a new one, which becomes as deeply rooted. Such an occurrence may be named "conversion". One famous example of such an event occurred on the road to Damascus.

Conclusions and Suggestions for Further and Broader Research.

From the experimental or historical data shown, we may say

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that Aztec culture could represent a pattern of serotonin deficiency effects. Serotonin deficiency among the Aztecs might have accentuated their religious and aggressive behavior patterns on the one hand, and on the other it might have led them, unconsciously, towards anthropophagy in order to attenuate it when it became too strong.

Harner (1977b: 51) wrote: "In *Tristes Tropiques*, the French anthropologist Claude Levi-Strauss described the Aztecs as suffering from 'a maniacal obsession with blood and torture'. A materialistic ecological approach reveals the Aztecs to be neither irrational nor mentally ill, but merely human beings who, faced with unusual survival problems, responded with unusual behavior." Combining ecological with neurological data we cannot agree with Harner, but we may expound Levi-Strauss' affirmation: the Aztecs were unconscious as to the basis of their behavior, and must be therefore considered the guiltless victims of an awful natural experiment.

Maize was an important food for the Maya too, but, even if they were very religious (with human sacrifices, Schele 1984) and aggressive, they seem to have not been cannibals. They appear to have had a greater availability of foods with high "R" value than the Aztecs. In particular, fruit of *Brosimum alicastrum* has a similar "R" value and an absolute quantity of tryptophan even greater than amaranth (Peters & Pardo-Tejeda 1982). In the tenth century, the Toltecs, coming from Central Mexico, occupied the Yucatan. At first, they practiced human sacrifice (fig. 4), and perhaps cannibalism. This change in rituals is suggested by architectural changes: Temples of Classical Period were built on the top of steep pyramids, and no space was before the temple's entry. On the contrary, Postclassic Period pyramids were less steep and a wide space, with a sacrificial stone and often with the *Chac mool* – a prostrate deity bearing on his abdomen a plate for victim's heart – was before temple's entrance. *Tzompantlies*, racks for collecting victims' skulls, were placed in ceremonial squares. Afterwards, the Toltecs behaved like the Maya. It is reasonable to suppose that at first they retained behavior typical of central Mexican people, and subsequently modified it, thanks to the high "R" value Maya foods.

Other Native American populations based their subsistence on maize: Pueblos, Natchez, Muskogean and Iroquoian tribes

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showed high religiousness or aggressiveness, with a wide use of torture on their enemies, and sometimes human sacrifice and cannibalism, whereas the Algonkian wild game hunters or the buffalo hunting Plains Tribes did not (a first study on this topic is in Ernandes et al. 1996). A general survey is shown below; some data are summarized in table III.

Southwest Tribes:

Pueblos (Taos, Picuria, Tewa, Hopi, and Zuñi) are not famous for war activity, but every village had war priests and warriors' associations (Farb 1968). Pueblos, particularly Zuñi, are included among the most religious men in the world (Dulaney and Fiske 1994). It is notable that Marlar *et al.* (2000) have recently shown evidence of cannibalism among the Anasazi (ancestors of Pueblos), who very likely had a maize-based subsistence. This evidence confirms previous research of Turner & Turner (1999), and previous and recent research of White (1992; 2001), who (2001) also reports that present-day Pueblos received with disconcertion the idea that their ancestors were cannibals. But what we stated about the Aztecs also applies to the Pueblos' ancestors: they were unconscious as to the basis of their behavior, and must therefore be considered unwitting participants in an awful natural experiment

The Yuma and Mojave were very aggressive; their religiousness was based on visions (La Farge 1956). Apaches (less maize dependent) did not fight with a ritual aim: they were robbers with atrocity, and avoided unnecessary risks. Their religiousness was of the typical shamanistic kind.

Southeast Tribes:

Natchez (destroyed by Frenchmen in 1731) had complex matrimonial and kin systems based on four classes: the last, composed by common people (*Stinkards*), had to furnish partners to the other three noble classes (*Sun*, *Noble*, and *Honored*). Children of noblewomen inherited their mother's rank, but children of *stinkard* women fell one grade below their father's (so, *Sun*-men's children fell on *noble* class, *Noble*-men's ones on *honored* class, and *Honored*-men's on *stinkard* class). This kin system was leading to a gradual decrease of common class components: war was then needed to maintain the *stinkard* class, to which prisoners were assigned.

Natchez considered themselves the chosen people; their

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government was a true theocracy, and their life was marked by numerous rites: "Ceremonies at the death of a [Great] Sun lasted several days and were conducted with great pomp. The climax came when a score or more persons were put to death so that their spirits might accompany their lord in the other world. Victims – mainly the Sun's wives – were given tobacco pills to numb their senses, then strangled by a cord. Others volunteered for sacrifice to honor their leader. Parents gained merit by offering children under three" (Stirling 1955).

Creeks, Choctaws and Cherokees were very bellicose: war was their most loved occupation; male prisoners were tortured and killed, while females and children were adopted. They also had several violent collective games, which were called "smaller brothers of the war" (La Farge 1956). They were very religious. Some shamans practiced fasting. After they were defeated, these southeastern American Indian tribes became rather peaceful; it is noticeable that their diet had improved due to the introduction of animal husbandry.

Plains Tribes

Few of these tortured their enemies. Some (as Mandan) practiced ritual self-torture. The Pawnee sometimes offered human sacrifices to the Morning Star. For this ritual, a beautiful maiden was captured from a neighboring tribe. These Plains tribes were in various degrees maize-dependent (table III).

On the contrary, the aggressiveness of the buffalo hunting tribes was more symbolic than actual: "Highest honor came from touching an enemy in combat with the hand; next was to touch him with bow or a coup stick carried for the purpose. It gave greater honor to spear and dismount a foe than to shoot him with bow and arrow or gun" (Stirling 1955).

The buffalo hunters' religion was shamanism and it was based on visions, which, according to some sources, were obtained with some difficulty.

Northeast Tribes:

In the XVII and XVIII centuries the Iroquois subsistence economy was based on maize (the Iroquois name for maize means "our life"). By their wars, at the same period, the Iroquois wanted to impose their "Great Peace" and to dominate the fur trade (Hunt 1940). They fought in an extremely fierce manner. According to De Voto (1952), no North-American Indian

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proved to be more merciless than the Iroquois; no tribe had more talent in military organization; few tribes fought better. Some of the prisoners were adopted, some were tortured, killed and eaten (the Iroquois tribe *Kaniengehaga* has been always better known as *Mohawk*, an Algonquian word meaning "cannibal"). The Hurons also tortured and ate many of their prisoners of war.

The Iroquois were very religious and they gave a sacred sense to almost all life actions. Among them there was a strong presence of magic thought and the idea of "orenda" as a "power" included in the matter, living or not; they believed in ghosts that went with warriors, even if they could not operate: this suggests that the Iroquois might be subject to hallucinations, even if they maintained the capability of distinguishing them from reality. They had both shamans and men skilled in ceremonies.

Algonquian tribes shared different agricultural dependence, as general rule lesser than Iroquois. Among them most of the Abenaki tribes lived in villages provided with fields for cultivating maize, beans and various vegetables, and they seem to have been the Algonquin Indians more dependent on maize. "Before the arrival of the white man, the Abenaki tribes of New Hampshire and Maine were compelled to join forces to resist the incursion into their territory by the war-like Iroquois", and "The cruelty of the Pigwacket Indians (an Abenaki tribe) was exceeded only by that of the Iroquois of the Hudson valley" (Kayworth 1998: 45, 44). By 1688, French Jesuit missionaries lived among the Abenaki Indians, learned their language and customs, converted most of them to Catholicism, and incited them against the English, with remarkable success in King William's and Queen Ann's Wars.

Other Algonquian Indians, mostly hunters, often fought bravely, but their wars nearly always had a defensive peculiarity. They did not torture enemies, Iroquois excepted. Their religion was simple. They did not have men skilled in ceremonies, but only shamans.

Other Continents

Africa

The Portugueses brought maize cultivation to the Guinea Gulf and South Africa during the slave trade. The Ashanti of

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Table III

Tribal Groups	Subsistence economy (average from tribal values)	Religiousness (estimates from source data)	Aggressiveness (estimates from source data)	Torture Auto-torture Human sacrifice Cannibalism
Pueblos	1 1 8	+ + + + +	?	[C*]
Hokan-Piman	3 2 5	+ + + +	+ + +	
Natchez-Muskogean	1 4 5	+ + + + (+)	+ + + +	T H.s.
Iroquoian	1 4 5	+ + + +	+ + + +	T C
Algonkian agriculturists 1	2 4 4	+ +	+ + (+)	t
Algonkian agriculturists 2	1 6 3	+ +	+ + (+)	t
Algonkian hunters	2 8 0	+	+	
Siouan agriculturists	1 3 6	+ + (+)	+ +	A
Caddoan agriculturists	1 4 5	+ +	+ +	H.s.
Buffalo hunters	2 8 0	+	+	

Correlation coefficients between:
agricultural dependence and religiousness: **0.81**.

agricultural dependence and aggressiveness (Pueblos excepted): **0.70**.

Pueblos: Hopi, Zuñi;
Hokan-Piman: Yuma, Mohave, Pima, Papago;
Natchez-Muskogean: Natchez, Choctaw, Creek;
Iroquoian: Iroquois, Huron, Cherokee;
Algonkian agriculturists 1: Delaware, Fox, Miami;
Algonkian agriculturists 2: Shawnee;
Algonkian hunters: Ojibwa, Micmac, Montagnais;
Siouan agriculturists: Hidatsa, Mandan;
Caddoan agriculturists: Arikara, Pawnee, Wichita;
Buffalo hunters: Algonkian: Blackfoot, Cheyenne, Blood, Gros Ventres, Piegan; **Siouan:** Crow (an offshoot of Hidatsa) and Teton.

Subsistence economy: the first digit refers to **gathering**, the second to **hunting and/or fishing**, the third to **agriculture.**

Symbols: **0:** 0 to 5% dependence; **1:** 6 to 15%, **2:** 16 to 25%; **3:** 26 to 35%; **4:** 36 to 45%; **5:** 46 to 55%; **6:** 56 to 65%; **7:** 66 to 75%; **8:** 76 to 85%; **9:** 86 to 100%.

Sources. Subsistence economy: Murdock 1967;
Religiousness, aggressiveness, torture etc.: see text.

T: wide torture.

t: torture limited to some enemies (i.e. Iroquois).

A: auto-torture (*i.e.: Mandan*).

H.s.: Natchez, Pawnee.

C: Iroquois, Huron.

[C*]: prehistoric Puebloan (Anasazi)

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Ghana and the Zulu of South Africa are examples of African populations for whom maize was the main food.

The Ashanti Kingdom, in the XVIII and XIX centuries, frequently pursued wars, first with the aim of imposing and reinforcing its hegemony on neighboring peoples, then for defence against the British army. Their military organization and discipline were remarkable. In the XVIII century the Ashanti Kingdom actively participated in the slave trade. Magico-religious thought was considerable; in ritual ceremonies human sacrifices was common.

The Zulu, under the command of Shaka, who was revered as a god, established the strongest kingdom of South Africa, dominating and annexing neighboring peoples by nearly continuous wars.

They were subjected to an iron discipline, with the death penalty being frequently practiced. In their life magic thought was predominant, and medicine-men were very important. The Zulu diet was based on "boiled maize-grains, toasted maize cobs, sour clotted milk, boiled sweet potatoes, a mash of pumpkins, fermented sorghum porridge" (Ritter, 1978). Beef was eaten on special occasions.

Europe

In Europe it seems that maize-based diets provoked their most visible effects in Italy and in the Balkan peninsula. In Italy, Venetian people, eating *polenta,* a maize dish prepared without an alkali cooking technique, suffered from pellagra and were regarded as being among the most religious in the Italian population. Also, they unconsciously felt that maize had to be eaten with beef[4], but, as they were mostly poor people they ate polenta with small birds captured by nets cast among trees. Cultivation and the eating of maize was widely diffused throughout the Balkan peninsula: in Romania, a maize based dish called "*mamaliga*" has been for a long time the basic food of peasants, and Yugoslavia followed Romania in its production. Kitahara (1986) "has calculated the dietary tryptophan ratio for 18 European countries to attempt to relate it to homicide rates. While initially no correlation was found between low tryptophan ratios and homicide, once social and cultural differences were

[4] In agreement with the principles of homeostatic regulation referred to § *Aztec Cannibalistic Rituals.*

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controlled for, low tryptophan ratios were found to be associated with high homicide rates" (Werbach 1995: § 3). Further research will explain if maize (or low trp/LNAAs ratios foods) consumption might have an influence upon the rising of ideological fanaticism and of violence, also sexual, in the recent inter ethnic Balkan conflict. As regards the past, in 1913 the *Carnegie Endowment for International Peace* sent a committee to investigate reports of atrocities by belligerents in the (First) Balkan War. The commissaries (as reported by Viola 1997) ascertained that war was characterized by a medieval cruelty, with mass rapes, genital mutilations, corpses roasted on the split and children decapitated ... a set of behaviors that we have seen as linked to serotonin deficiency.

So we think it is of interest to examine the reasonable nexus between a diet based to a great extent on low trp/LNAAs ratios foods and the development of religious or ideological fanaticism with the tendency to resolve ethnic or social conflicts by violence, also sexual.

We suggest that a low "trp/LNAA" value from a diet based on maize or other foods that can lower "R" value might favor the development of fanatical ideologies, and a risk factor towards violence or intolerance on the occasion of conflicts.

Appendix

Possible remedies for Serotonin deficiency are themselves problematic:

1 Increase of meat consumption, or of vegetables with high R value (as amaranth or *Brosimum alicastrum*), and decreasing the consumption of foods with a low R value. These methods seem to be the most effective, but there are some difficulties: some people, for example, choose not to eat any meat, while others choose not to eat meat such as pork, which has an high R value; the eating of vegetables with a high R value must be promoted.

2 Tryptophan supplement: "The functional effects of administering tryptophan ... are relatively small" (Fernstrom 2000). Oral tryptophan might be damaged by the acidic and oxidant environment of the stomach; it may be of interest that its administration is by capsules that are gastro-resistant but entero-soluble.

3 5-Hydroxytryptophan supplement: 5-HTP is administered as a drug to increase brain serotonin. It crosses the Blood-Brain Barrier more easily than tryptophan and enters into all the

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neurones. In catecholaminergic neurons it is converted into serotonin by the enzyme *aromatic aminoacid decarboxylase*: so these neurons (as it was put in evidence by M. Carruba, pers. comm. 1998), besides their own neurotransmitters, release in synapses also serotonin, that must have no receptors in those synapses and so, at least, may obstruct normal transmission.).

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Gender Roles, Traditions & Generations to Come: The Staffing of Social and Political Institutions

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Whatever else a social or political institution may require, ongoing staffing is a necessary, if not sufficient requirement for its continuing existence. People are the *sine qua non* of any community or organization. If any community cannot generate a populace, then the organizations within that community lose their viability. It is suggested that a sea-change in reproductive dynamics occurred during the 1960's which lent greater survivability to some cultural formulae and lent lesser survivability to alternative cultural formulae. Cross-national data are presented which suggest that a community organized around gender complementarity has a competitive advantage, across generations, over a community organized around gender egalitarianism.

Key Words: Cultural evolution, gender roles, parent-child relations, gender complementarity, women's education, fertility.

Every child born this day is guaranteed to have a very long line of lineal ancestors. The length of the line depends upon whether the measurer is using *Homo*, hominid, mammal, vertebrate, or biota as the frame of reference. As a matter of contrast, no child born this day is guaranteed to have grandchildren: descendants. Not all children survive to puberty. Not all post-pubescents will have offspring. Not all of those offspring will have offspring. On the other hand, each person who is alive in 2200 A.D. will be able to trace his or her lineage back to ancestors who were alive in the year 2000 A.D. Alternative citizens of the year 2000 A.D. will have no lineal descendants to represent them in the year 2200 A.D.

This article argues that some cultural formulae bias the chances for their adherents being represented two centuries

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hence and that alternative cultural formulae bias the chances against their adherents being represented two centuries hence. Framed differently, some (sub)groups will behave in such a way as to generate a positive and promising long-term trajectory for themselves and their cultural formulae; while alternative (sub)groups will behave in such a way as to generate a problematic trajectory for themselves and their cultural formulae.

Furthermore, it is a reasonable inference that the land masses of the planet will not be devoid of inhabitants, but will be teeming with various versions of *Homo sapiens* in all those places which can sustain life throughout the year. This article addresses (i) who those people may be and (ii) how they get there. The article is – at base – educed from one essay and one correlation.

The Essay: Hardin's "Tragedy of the Commons"

In his seminal article "The Tragedy of the Commons", Hardin (1968) cleanly and cogently parsed out the problems inherent in the tenuous balance between individual freedom and the viability of the commonweal. That is, there are times when individual freedom must be curtailed for the overall society to function efficiently and competitively – in a very competitive world. One of Hardin's primary examples was "pollution". That is, if everyone were allowed to "pollute" *ad libitum*, then the commonweal would be threatened with a non-sustaining environment. A second example is "homicide". If everyone would be allowed to murder any and all who annoyed him or her, then anarchy and mayhem would fragment the society. The automobile serves as a final example. If driving or parking were totally unsupervised, then traffic would be impossibly gridlocked, and transportation would grind to a halt. To prevent societal disintegration, society has devised laws and taboos and expectations which limit individual freedom for the good of the group. Consequently, "murder", "polluting", and creative parking are all curtailed and erased from the individual's palette of personal liberties.

The Correlation

Across nations, the relationship between rates of natural increase (birth rates minus death rates) and the percentage of women (rather than men) in institutions of tertiary education is significant and negative ($r_p = -.514$, $p < .001$; $n = 168$ nations)

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(CIA 2002, United Nations 2001).[2] And, given the use of the very coarse unit of "nation", which lends itself to false negatives, a rather robust 26% (adj. $R^2 = -.514^2 = .264 = 26.4\%$) of the differences in rates of natural increase can be attributed to changes in the proportions of women in tertiary education institutions.[3] That is, as the women of a nation increase their proportion in tertiary education, the fecundity of the nation decreases.[4]

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[2] Of course, anyone familiar with the field would not be surprised at the outcome. Discussion about the "demographic transition" is a mainstay in courses in the social sciences. The relationship between female fertility and education levels has been a cottage industry for decades with the same results and conclusions being reached. See Hirschman 1994, Hirschman, Tan, Chamratrithirong, & Guest 1994, Mason 1997, Robinson & Harbison 1995, Van De Kaa 1996, *inter alios*. Accordingly, this statistic is not presented as being new or innovative. What is being presented, in an additive manner, are the consequences of such a statistic, not merely for the individuals involved at that time, but for the impact such patterns have upon cultural evolution. Such a putative impact has not been as extensively analyzed.

[3] Ecological inference. A problem which this type of analysis faces is that of the relationship between aggregate data and individual data. Framed differently, aggregate data are not equipped to isolate behaviors of an individual, and, thus, inferences from an aggregate, an ecological unit, are generally inappropriate when directed at any individual (see Robinson [1950] for an early discussion of the problem, and see Borgatta & Jackson [1980], Goodman [1959], Hanushek, Jackson & Kain [1974], King [1997], Langbein & Lichtman [1978], Pedhazur [1982] for subsequent discussions plus partial solutions to the problem of relating aggregate data to individual behavior). Suffice it to say this that the analysis is not construed to specify how any one individual would or would not behave. The analysis presented here is content to attempt to discover what – if any – behavior patterns are aligned with other behavior patterns.

[4] Correlation coefficients (such as rp), of course, cannot demonstrate causality. And there are three basal interpretations available to the significant correlations presented here: (1) changes in rates of natural increase are driving women's educational achievements, or (2) changes in educational levels are driving rates of natural increase, or (3) a third variable is driving both of the other two variables: natural increase and educational levels. The likelihood of each of the three is examined below. The first option – changes in natural increase are driving educational achievements – seems, at face value, implausible. Functional sterility would not be a reasonable explanation why women would increase their pursuit of higher levels of education. The second – changes in education levels are driving rates of natural increase – has a ring of common sense to it. However, students generally achieve a terminal degree in tertiary institutions by their low or middle twenties. Nearly two decades of fecundity are still available to such women.

Accordingly, a third variable – occupational & income mobility – is suggested to be the operant variable. Higher education is certainty a conduit to enhanced occupation & income mobility. And, indeed, other surveys have documented that when women do have an opportunity to enter into a cash occupation, they do just that. Thus, it is suggested that the drive-wheel for the inverse relationship between rates of natural increase and the levels of women to be involved in the educational process is the expectations by women for a higher income via a skilled profession.

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Any intact, organized community (in the context of low infant mortality) needs 2,100 lifetime births per 1000 women to replace itself. Leaving net immigration aside for the moment, if the number of lifetime births falls below 2100, then, over time, the community would evaporate or be supplanted or displaced by a competing, more fecund community. The lower the number of lifetime births, the faster the evaporation or the displacement. For example, based on current birth rates (of 1.41 lifetime births per woman), Japanese demographers have projected that the population of Japan will contract from about 130 million in 2002 to less than 70 million by the year 2100 with an increasing proportion of the Japanese populace 65 years of age or older (Statistics Bureau 2002). See Table 1 for nations with the most/least projected lifetime births.

TABLE 1

Highest (top 10) and lowest (bottom 10) fertility rates (mean number of children per woman) by country and geographical area (Central Intelligence Agency 2001).

Highest Ranked:				*Lowest Ranked:*			
Rank	Area	Country	Children per Woman	Rank	Area	Country	Children per Woman
1	Africa	Somalia	7.18	1	Europe	Latvia	1.13
2	Africa	Niger	7.16	2	Europe	Bulgaria	1.13
3	Africa	Ethiopia	7.07	3	Europe	Spain	1.15
4	Asia	Yemen	7.05	4	Asia	Singapore	1.16
5	Africa	Uganda	6.96	5	Europe	Czech Rep.	1.18
6	Africa	Dem. R. Congo	6.92	6	Europe	Italy	1.18
7	Africa	Mali	6.89	7	Europe	Estonia	1.19
8	Africa	W. Sahara	6.64	8	Europe	Belarus	1.25
9	Africa	Chad	6.63	9	Eurasia	Russia	1.25
10	Asia	Gaza Strip	6.55	10	Europe	Hungary	1.25
		Mean	6.91			Mean	1.19
		sd	0.23			sd	0.05

The Argument

For any intact social group to persist across generations, that

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social group must have a continuous supply of citizens, a continuous supply of people. "People" are a *sine qua non* which any community must exhibit to have continuity – across generations – for that community. There are two routes for "peopling" a society: (1) home-grown births and (2) immigration (incorporating some other groups' births). Let's look at births first and, in a later section, immigration will be examined.

Births

For any given year and for any given society, if the death rate (the number of deaths per 1,000 population) is subtracted from the birth rate (the number of births per 1,000 population), then the result is the rate of natural increase for that society, for that year. If the resultant number is positive, then the population is growing. If the resultant number if negative, then the population is shrinking. If the resultant number is zero, then the population's size does not change.

Under the rubric of the notion that occasionally a reminder will trump inspiration, it is useful to note that it is a mother who gives birth to child. No child exists without being birthed by a woman. A woman can exist without bearing a child, but no child can exist without being borne by a woman. In the middle of the 20th century, the option of women to efficiently regulate their own fertility became fairly widespread, if not universal. Thus, a woman, if she foregoes chastity, could decide to be a mother or not. A mother could decide to have one child or more than one child. The technology which would help allow her to exercise that option became widely available and relatively inexpensive.

The value systems or moral codes which allowed, if not encouraged, the utilization of that technology also emerged in various areas of world, but were concentrated initially in highly industrialized nations such as Japan or those in Western Europe and its extensions (e.g. Canada, Australia, the U.S.). Thus, in mid-20th century, efficient and affordable technology became (theoretically) available to everyone, i.e. a constant. The moral or value systems which would embrace or reject such technologies became a variable.

As mentioned earlier, while the technology to prevent conceptions and births is theoretically available to all societies; any cultural expectation or philosophy to actually utilize those technologies is an entirely separate matter. Framed a little

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differently, the ethos or value system of a community could evolve such that mating and reproductive histories per individual are totally within the purview of the individual. Because females are the limiting resource in any population changes, it would be the individual females – one at a time – who would opt to utilize or to not utilize reproductive technologies. At the other end of the spectrum, the ethos or value system of a community could evolve such that plural motherhood – being a multigravida or polypara – was mandated by the supernatural, either deities or ancestors. The woman's cultural rules then become a mirror to the dictates of more powerful beings: more supernatural beings. The failure of any woman to exercise her fertility with plural births could be interpreted as reflecting her flaunting of the supernatural and would threaten wrack & ruin to any overall society which harbors such females.

Between the polarities of rampant individualism versus oppressive collectivism would lie a huge range of gradients and compromises. (See Harris [1979] and [Ross & Harris [1987] for examples and discussion; cf Aghajanian [1979, 1988], Day & Mackey [1981], Zelizer [1985]. See Rosenblatt et al. [1973] for examples of intense cultural pressures and actions to avoid sterility. See Betzig [1989] for cross-cultural examples of reactions to [female] infertility).

Accordingly, within the context of quasi-universal access to effective contraceptive technology, it is suggested that value systems which more restrict women to the mother-role would have higher birth rates than alternative value systems which more remove restrictions upon women.

A Test

A comparison of Europe versus the Moslem world of north Africa and the Middle East is a fairly direct test of the dynamics described above.

Europe Versus the Moslem Swathe

Although these two sub-samples share a geographic propinquity – the Circum-Mediterranean region – their demographics, as presented below, are quite distinct. The argument being made here is that any group which is operating below replacement value will tend to be supplanted by or displaced by any groups which are operating above replacement

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value. As the displacement occurs, the immigrants bring with them their societal traditions which generated the occasion of the displacement. Part of their societal traditions would include the elevated fertility rates which, in turn, entails expectations of the primacy of the mother role for women.

Two (independent) variables are surveyed: (i) the percentage of females – rather than males – in tertiary educational institutions and (ii) the percentage of females in their national Parliaments. The rationale is that tertiary education, education beyond the high school level, prepares the student for a career. Almost any "career" involves a lifestyle not circumscribed by the status-role complex of mother. The inclusion of women in their national Parliament is strongly antithetical to the pre-eminence of a functional patriarchy.

TABLE 2

Countries in Europe (n =36) versus countries in a Moslem swathe (n = 25) along five demographic indices (Central Intelligence Agency 2001, United Nations 2001).

Index/n	*European*		*Moslem swathe*		*t*	*p <*
	Mean	*s.d.*	*Mean*	*s.d.*		
Percent annual rate of natural increase/ n = 61	0.2	0.5	2.4	1.1	152.7	.001
Percent of female tertiary students/ n = 61	50.2	5.6	39.0	16.0	15.1	.001
Percent of females in national Parliaments/ n = 61	17.7	10.6	3.0	3.7	43.9	.001
Percent of labor force in agriculture/ n = 61	12.5	11.8	35.0	24.8	22.5	.001
GDP per capita income (in dollars)/ n = 61	12,102.20	7,669.40	5,986.80	6,442.40	8.6	.01

There were appropriate demographic data for 36 of Europe's countries (i.e. a sample with n = 36). The second sample was a swathe of 25 countries which begins with Mauritania and runs eastward across northern Africa through the Middle East to Pakistan ([n = 25 nations]) In these countries, the Moslem religion is dominant. The percentage of the annual rate of natural increase for the Moslem swathe was

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2.4 (s.d. = .85) which was higher than that of Europe (mean = 0.2 [s.d. = 0.5]) (t [59] = 161.9; $p < .001$). See Table 2. In fact, virtually all of the European countries are below replacement value of 2.1 children per female (or 2100 children per 1,000 females). Virtually all of the countries in the Moslem swathe are well above replacement value.

Aligned with the higher rate of natural increase, the Moslem swathe – compared to Europe – also had (i) a lower percent of females in tertiary educational institutions and (ii) a lower percent of females in their national Parliaments. In addition, the Moslem swathe – compared to Europe – had (iii) a larger percentage of their labor force engaged in agriculture. See Table 2. Thus, lower effective fertility occurs when (i) women have access to careers, (ii) can enter into power politics, and (iii) can enter into a cash economy.

An important facet of the worldview found within the Moslem swathe is the strongly held view of gender complementarity, rather than gender egalitarianism or gender equality. As a consequence of this initial premise, male and female roles become, in the main, quite separate. For example, the countries of the Moslem swathe are generally considered to be highly patriarchal with women precluded from positions of economic or political power and from a wide spectrum of occupations. Authors, including feminist ideologues, who have written ethnographic accounts of the relevant Moslem countries invariably refer to the strongly patriarchal character of the political and economic structures. The question is never "Is the country patriarchal?". The ethnographic accounts revolve around how the patriarchy developed and how is it maintained. For example, Ahmed (1992) writes: The subordination of women in the ancient Middle East appears to have become institutionalized with the rise of urban societies and with the rise of the archaic state in particular..." and, as Islam crystallized its theology, "Implicit in this new order was the male right to control women and to interdict their interactions with other men. Thus the ground was prepared for the closures that would follow." See Kadioglu (1994) for a parallel argument for women's role in Turkey. Toubia (1988, pp. 2-3) makes the case quite clearly: "Arab women are dominated by men in every area of life in the patriarchal family system: state, political party, trade union and public and private institutions of all types." She noted

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that over 97% (97.2%) of the Yemeni women, as late as 1975, were illiterate. Badran (1995, p. 5) notes that "the woman was perceived as essentially or exclusively, a sexual being, unlike the man who was only partly understood in terms of his sexuality". Gerami (1996, p. 157) views the current version of Islamic fundamentalism as "...nipping a very young feminist movement in the bud and under the banner of nature's mandate, pushed women further into the family. They managed to cast woman's individualistic identity as a perversion of her nature plotted by Western imperialists". Obermeyer (1995, p. 370) observes that the "Islamic emphasis on complementarity rather than equality in gender roles" makes dialogue with a worldview predicated on equality rather than complementarity extremely difficult. Inhorn writes that: "In a society (Egypt) where the patriarchal fertility mandate is emphatic, the social and psychological consequences of 'missing motherhood ' – of being a woman unable to deliver a child for her husband, family, affines, community, faith, nation, and not inconsequentially her – are nothing if not profound". (For reviews of the literature, see Al-Qazzaz [1977], Ansari [1973], Hekmat [1997], Kamali [1984], Meghdessian [1980], Mernisse [1991], Raccagni [1978], and Tucker [1993]). For theoretical overviews, see Lerner (1986) and Walby (1990).

Thus, the European sample with fertility levels below replacement value and an ideology biased toward gender egalitarianism is geographically situated next to a Moslem sample with fertility levels well above replacement value and an ideology biased toward gender complementarity; wherein the woman is constricted toward the mother role. In terms of cultural evolution, the inertia would seem to be with the Moslem swathe's bio-cultural formula and its displacement of that of the Europeans. Below is empirical support for the reality of such a displacement. The influence of immigration is now introduced.

Immigration: the European Test-tube

Europe experiences a net influx of immigrants. When the immigrants enter and settle into their new homeland, they, of course, bring with them their world-views, expectations, and traditions which had successfully led to their own socialization. This cultural package often includes an anticipation of relatively high fertility. For example, Turkish immigrants into Austria average 4.43 children per woman. This figure is more than twice

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the figure for Austrian nationals (1.64 children per woman). Moroccan immigrants into Belgium average 5.7 children, and Turkish women average 5.0 children. Both of these averages are more than three times the mean number of children per Belgium nationals (1.6). Pakistan immigrants into Great Britain average 5.3 children per woman. This figure is more than triple the figure for Great Britain's average of 1.7. French nationals average 1.82 children per woman which is less than half of immigrants from Algeria (4.24), Morocco (4.47), Tunisia (4.67) and Turkey (4.55). German woman average about 1.3 children each whereas Turkish immigrants average more than twice that number (2.9 children). Dutch women average 1.6 children, but Turkish women who emigrate to the Netherlands average 3.1 children and Moroccan emigrants average 4.7 children. Finally, Swedish woman average 2.1 children, but Turkish emigrants average 3.45 children (Coleman, 1994). See White (1997) and see Morris (1997) for discussion. Unless the immigrants illustrate instantaneous assimilation, the cultural inertia of the immigrants' own socialization would be expected to impact, to some degree, upon the social milieu of their new country.

The U.S.: Religious Denomination and Gender Roles

For American religious denominations, some denominations more stress gender complementarity and thereby constrict women's roles toward motherhood. Other religious denominations more stress gender egalitarianism, e.g. women clergy, and minimize any division of labor by gender. Over generations, those denominations which more stress gender complementarity are – across generations – are poised to replace or displace those denominations which stress gender egalitarianism. See Table 3.

By extension, in the U.S., those communities sub-cultures – religious or otherwise – which stress gender complementarity and thereby constrict women's roles toward motherhood will replace or displace those sub-cultures which stress gender egalitarianism and minimize any division of labor by gender. For example, in the Marquis *Who's Who* nearly 40% of the women in the listing were childless (*Who's Who* 1997). The average number of children per woman was 1.25 (s.d. = 1.37). No coherent community can sustain itself with such a demographic pattern. Certainly it must be the case that a culture experiencing fertility below replacement value will be displaced by a culture

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experiencing fertility above replacement value. The only variable would be the length of time needed for the displacement.

TABLE 3

Growth of selected religious groups from the 1920s to the 1960s and from the 1960s to the 1990s (Yearbook of American and Canadian Churches, 1925-1999).
See Appendix I for sources on categorization of the denominations.

Group	Year						
	Mid 20s	Mid 40s	Mid 60s	Mid 80s	Mid 90s	60s/20s	90s/60s
	(000)	(000)	(000)	(000)	(000)		
Religions Emphasizing Gender Egalitarianism:							
Episcopalians	1,164.9	2,155.5	3,410.7	2,775.4	2,536.6	**292.8%**	**74.4%**
Unitarian-Universalist	117.7	112.3	167.0	170.5	141.3	**142.9%**	**84.6%**
Judaism[a]	4,081.2	4,641.0	5,600.0	5,817.0	5,900.0	**137.2%**	**105.4%**
Reorg LDS	89.5	116.9	168.4	192.4	177.8	**188.2%**	**105.6%**
Lutherans	2,546.1	4,731.9	6,507.2	7,932.8	8,270.8	**255.6%**	**127.1%**
Religions Emphasizing Gender Complementarity							
Mennonites	85.6	167.3	175.7	212.2	293.7	**205.3%**	**213.0%**
Latter Day Sts	535.7	911.3	1,789.2	3,601.0	4,711.5	**334.0%**	**263.3%**
Old Order Amish	7.6	13.4	20.4	34.0	80.8	**268.4%**	**396.1%**
Hutterites	0.7 *	0.3	7.6	4.0 **	41.6	**1085.7%**	**547.4%**

[a] Importantly, these numbers do not include the ultra-orthodox Hasidim
* These 700 are reported to have moved to Canada.
** An additional 27,200 are reported to have lived in Canada.

A Global Perspective

As introduced earlier, natural increase is (negatively) related to the percentage of females, rather than males, in tertiary educational institutions ($r_p = -.514$; $p < .001$; $n = 168$). Natural increase is also (negatively) related to the percentage of national Parliaments which are female ($r_p = -.427$; $p < .001$; $n = 165$). When both variables of female participation in positions outside of the home act in tandem, the result is also significant ($R = .610$; $p < .001$; $n = 160$).

When the impact upon natural increase by (i) the percentage of females in tertiary educational institutions, (ii)

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the percentage of females in their national Parliaments, (iii) the percentage of the labor force engaged in agriculture, and (iv) GDP per capita income are examined, the result is also significant ($R = .644$; $p < .001$; $n = 151$). These four (independent) variables account for nearly 40% (adj. $R^2 = .399 = 39.9\%$) of the variance in the level of natural increase. See Figure 1. Again, when women are able to (i) have a career and (ii) participate in political power structures, and (iii) move from subsistence agriculture to a job for salaries/wages, then birth rates and rates of natural increase plummet.

Discussion

Two models present themselves to help give context to the dynamics described above. One is a cyclical model, and the second is a replacement model.

Cyclical Model

It is a logical category that there is some type of demographic thermostat which triggers greater fertility if replacement values are not met by a society's women. However, no such thermostat has been presented in the literature. In addition, no demographic data have been presented which would suggest that such a thermostat, in fact, exists at all. There is no evidence of cyclicity.

Replacement Model

It is also a logical category that (sub)groups of women with greater numbers of children would replace (sub)groups of women with fewer numbers of children. That is, lands would not remain empty if children-grown-to-adulthood fail to be conceived or to be raised. If a barren lineage disappears, then its geographical space would be filled by a more fertile lineage. This explanatory category seems better aligned with the data.

Thus, independent of intent, plans, desires, or "plots" on the part of political and social leaders, a social dynamic does seem to be in place and operative. The dynamic is suggested to have its own inertia. Namely, a cultural formula which presents to its women the availability of options that conflict with the mother-role is a cultural formula which is simultaneously non-competitive with the alternative. The reverse of this dynamic is that a cultural formula which presents to its women virtually no other role than that of mother is a cultural formula which is

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competitive and prone to replace alternatives.

Conclusion

That cultures change over time can be seen as a given. The Rome of the 20th century is quite different from the Rome of Caesar. The inhabitants of Manhattan have undergone a series of transformations since 1620. Chaucer's England is clearly distinct from England of the Beatles. The direction and speed and magnitude of cultural changes have received a good deal of theoretical attention (Carneiro 1973, Fog 1999, Goldberg 1973, Harris 1979,1999, Lowie 1920, Steward 1955, Morgan 1963, Maine 1873, Tylor 1958; Frazer 1958; see Harris [1979] for a review of the literature on macro-theories). Impetuses of such changes have been conceptualized in the form of shifts in technology (Childe 1951; White 1959), economic structure (Fischer 1996; Harris 1979; Marx 1904), plus communication efficacy and forms of media (McLuhan 1964, 1967, 1989). The argument given here is not intended to be in conflict or to compete with any of these theoretical models. What is intended are the two suggestions that (i) cultures whose reproductive strategies and tactics which do not divert women away from their biological roles as mothers have a decided advantage – across generations – over cultures which assume any alternative course, and (ii) a major cog in the drive-wheel in cultural evolution is "what groups of women have how many children, under what circumstances".

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Appendix

Citations for characteristics of religious denominations in reference to gender complementarity vis-a-vis gender egalitarianism	
Dominations more biased toward:	*Citations*
Gender egalitarianism	
Episcopalians	Chalfant, Beckley & Palmer 1994, Gallup & Castelli 1989, Kosmin & Lachman 1993
(Reform) Judaism	Gallup & Castelli 1989, Jacobson 1995, Kosmin & Lachman 1993,
Reorganized Church of Jesus Christ of Latter-day Saints	Mead 1995, Melton 1993
Lutherans	Chalfant, Beckley & Palmer 1994, Gallup & Castelli 1989, Kosmin & Lachman 1993
Unitarian-Universalists	Chaves 1997, Mead 1995
Gender complementarity	
Old Order Amish	Driedger 1988, Hostetler 1980, Kraybill 1993, 1994, Kraybill & Olshan 1994, Nonaka, Miura & Peter 1994, Olshan & Schmidt 1994, Umble 1994, 1996, Wasao & Donnermeyer 1996.
Hutterite Brethren	Hostetler 1983, Nonaka, Miura & Peter 1994, Peter 1987, Van den Berghe & Peter 1988
Latter Day Saints	Gallup & Castelli 1989, Kosmin & Lachman 1993 *Gospel Principles* 1978
Mennonites	Bush 1998, Chalfant, Beckley & Palmer 1994, Driedger 1988

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SEYMOUR W. ITZKOFF

The Inevitable Domination by Man

An Evolutionary Detective Story

Prof. Itzkoff rejects the suggestion that humans evolved to their highest level in Africa and suggests that truly modern *Homo sapiens* evolved to their present status as caucasoids and mongoloids in northern Eurasia. Spreading outward they admixed with older stocks in warmer zones creating man's contemporary pattern.

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The Intelligence Divide: A Contemplative Survey of Human History

Seymour W. Itzkoff[1]
Smith College

The author rejects a recent African origin for *Homo sapiens sapiens* and argues that the sub-species' explosive development in intelligence was a Darwinian response by a migratory population domiciled in the challenging climatic conditions of Northwestern Eurasia. The history of *Homo s. s.* intelligence, and especially of Caucasoid intelligence, is traced, and the spread of *Homo s. s.* genes into other world populations is charted, with particular attention to the flows of genes into predominantly Mongoloid populations. In conclusion, the article contrasts the success increasingly enjoyed by the Northeast Asiatic intellect against the question mark that hangs over the survival of Western Caucasoid intelligence.

Key Words: Intelligence, Cro-Magnon, *Homo sapiens sapiens*, Caucasoid, Mongoloid, Negroid, Capoid, Amerind, Australid, evolution, migration, Africa, Eurasia.

A Revolutionary Intelligence

Several millions of visitors have visited the ancient Paleolithic caves of France and Spain, where they have gazed in awe at the artistic achievements of the ancient Cro-Magnon hunters some 25,000 years ago. They have observed in Lascaux and Altamira artistic renderings which in terms of skill and esthetic realization are equal to anything that has since been created, albeit in a rough and ready world where hunter, artist, and citizen were probably encompassed by the same persons. At Cap Blanc they experienced a sculptured frieze of animals that could have been placed on the Parthenon without apologies. Indeed, within the Vatican, the dark confines of the Sistine Chapel realized the same conditions of mysterious sanctity that were evoked in the ancient caves, the flickering wicks that charged the undulating stone canvas. Without doubt the same mentation that characterized the artistic work of a Phidias in Athens or a Michelangelo in Rome inspired these Cro-Magnon artists so many thousands of years earlier.

The abstract brain which created these evocations so many

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thousands of years apart was well in place in Eurasia at a remote period. But it was then unique on our planet, for there were many other people living on our earth, and in the same time frame, who lived much simpler and basic subsistence lives. This brain was a unique creation of evolutionary time. Perhaps it was a fluke that the explosion in size and structure occurred in the north. Their art and technology of a uniquely advanced form was characteristic of these people from the Urals to the Atlantic, from the southern boundaries of the glaciers to southern Europe and into the mid-East and western Asia. These high cognitive *Homo sapiens sapiens* genes gradually made their way into other geographies and other humans over time, perhaps from c. 150,000 years ago when the brain revolution that revealed itself in the physical morphology and the culture Cro-Magnons first appeared. In this way the human genus became one species as it was gradually lifted over the brain Rubicon from *H. erectus* to sapiency.

We ought not scoff at this presumptive intelligence, given the simple if beautiful tools, borers, scrapers, hand axes, spear and arrow heads, needles, combs, now made of bone, ivory, flint, precious stones, fabricated with excruciatingly careful and diligent care and perception. Primitive stuff, perhaps, compared to computers and atomic bombs. But remember, we do not judge the achievements of a people by what they have inherited. Rather, the test of any progress in civilization is made by the advances a people make over the previous generation. And these Cro-Magnons even compared to their indigenous competitors in Eur-Asia, the Neanderthals, they too having Caucasoid racial characteristics, but primitive in brow and bone, were way beyond the existing norms of human achievements, both material and cultural.

The mind numbing repetitive models of tool production of the Neanderthals and other transitional humans throughout the world was reflective of a brain heavily encased in bone. The Cro-Magnons were a physical and cultural "sport" in a line of increasingly intelligent creatures, some of whom had migrated out of their African homeland possibly as much as one or two million years earlier. We don't know as yet what created the genetic revolution that produced a baby-faced brain bulging creature that we in retrospect call Cro-Magnon, the ancestors of the modem Europeans and West

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Asians

There are two possibilities, both related. One is that a somewhat more brainy line of humans originating in Africa wandered north along with other less evolved lines of humans, leaving behind the ancestral forms in the ancient African "Garden of Eden." The second, is that unique events after the migration out of Africa produced this explosive brain and its *Homo sapiens sapiens* bearers. These events, environmental or inter-cultural competition, ostensibly occurred during a long sojourn of climatic and ecological instability in the north.

Over time, undergoing the more changeable, often threatening weather variations characteristic of the ebb and flow of the glaciers, they underwent their crucible of survival. From this vale of danger, only a few survived. There is some genetic evidence for this close homogeneity that we later find in intelligence and culture among the Cro-Magnons, and as later transmitted to modem populations.

We must remind the reader that intelligence is merely one of the tactics that animals use in the Darwinian equation of survival. It has been an adaptive element in the evolution of life for almost two billion years. The keys to its persistence in the repertoire of life strategies are the ever changing nature of our environment, which challenged some creatures to take a more aggressive approach to change by moving around to find sustenance, by mutating often to take advantage of the ever changing external world, and by learning how to feed on other organic forms of life, i.e., predation.

Out of this successful adaptive tack, animals were separated from plants. Over time we discover the mammals, then the primates, finally, humans, the most intelligent life forms of the pack. Truly, the bacteria will probably win out in the long run, but humans have some time left on top of the predatory mountain. Survival as a species depends on using our inherited practical intelligence, instead of frittering it away on the bizarre. The key element in the success of intelligence in terms of producing a creature such as *Homo sapiens*, is prediction. A primed cognitive brain allows such a creature to live in a deep time zone of successful expectation, intuiting what will occur, and taking pains to anticipate the events.

In this way a line of human animals in the cold north, were able surmount the terrible ecological conditions of frost and

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want. Challenges could have suddenly descended upon them in their once rich hunting grounds, turning it into a bleak arctic-like landscape. The tradition of larger brains embedded in the genetics of this line of northerners, of a sudden came into its own. A few talented far-seeing individuals survived, passed on their genes for bigness of brain, delicacy of bone, energy, torrential and inquiring. These survivors envisioned possibilities where others saw only bleak hopelessness.

They were northerners, bleached of skin to better utilize the vitamin inducing rays of ultraviolet from a distant sun. The biochemistry of intelligence, however, has no racial coloration. It can and was passed on in variable quantities for a hundred thousand years to others who crossed the migratory paths of the Cro-Magnons.

The Myth of African Modernity

A myth widely publicized in the popular politically correct press is that modem humans, e.g., Cro-Magnon, originated in Africa, anywhere from 500,000 to 200,000 years ago, starting out as African Eve. This supposed genetic mother of us all created a small population of highly sapientized modernists who left many of their brutish African fellows behind, as they wended their way north, east, and west, wiping out all the other brutish humans who had migrated Out-of-Africa before them during that primeval hegira. This clearly would have been a genocide of epochal proportions. The out of Africa butchers, became separated geographically and mutated into the various races discovered at the beginning of historical times. The evidence for this theory is located in the laboratory and with computer generated molecular "trees," the roots of which pointed the authors of this hypothesis to an African genesis of modem humans.

It is easy to understand the popularity of such a theory. It brings tragic Africa, its current populations, as well as the impoverished New World descendants of African slavery, back into the center of modernity and equality. Scientists studying these matters can now side with the angels, receive luscious grants from fawning western governmental agencies. Suspicious African nationalists welcome them back into Africa to renew their diggings, assured that they will come up with results that will benefit the political/economic needs of these nations.

Unfortunately, the theory is politically correct pseudo-

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science. The hypothesis has not been sustainable within the current debates echoed in the relevant scientific literature. For one, these supposedly deterministic molecular "trees" with their resonance of mathematical invincibility have been seriously critiqued. The conclusion is that these molecular "roots" leading irrevocably only to Africa are blatantly biased, other equally viable molecular "trees" lead to the origin of modem humans in Europe, Asia, and elsewhere. Secondly, the required genocide is a myth because of the continuity in terms of racial and other morphological and cultural characteristics of the ancient populations deemed to have been destroyed. These populations did not sharply change over the many millennia that this total wipe-out of humans was supposedly taking place by the children of African "Eve."

People of Mongoloid, Caucasoid, or Australid racial characteristics existed before 500,000 years ago. They were somewhat more advanced, but still basically of the same ethnic character, after 200,000 years ago. Primitive Eur-Asian Neanderthal-like peoples have been traced back to about 250,000-200,000 years ago. They were still in this region of the world about 45,000 years ago when the Cro-Magnons began mingling with them in the ancient Neanderthal homeland. Both "species" of humans co-existed for at least ten thousand years within the same general ecology and geography, the Neanderthals disappearing some 27,000 years ago. There is increasing evidence that Neanderthal genes were absorbed by these Cro-Magnon Eur-Asian populations. And they are probably still floating around as recessives in the modem populations who today live in these climes. This continuity is true of all the other populations around the world, especially the Mongoloids, who trace part of their origins back to Beijing Man, some 500,000 years ago, and before.

The final nail in this sophistic tale is driven by the complete paucity of evidence for any such migration out of Africa, and its supposed calamitous, if revolutionary, human displacements. No trail of destruction or migration exists during this time frame. On the contrary there is a volume of empirical evidence that argues against such claims. The most important fact in the fossil record is the continuity of the physical and cultural characteristics of the peoples both within Africa and beyond Finally, the true revolutionary people were the Cro-Magnons.

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They were and are northerners with physical characteristics of the temperate north, and a culture that was unique in the evolution of humans. Eur-Asia was its homeland.

High Intelligence Creates Civilization

The great reversal in the movement of humans, north and south, began at the beginning of a period of continental climate changes, some 12,000 years ago. For the approximately 35,000 years before this change, the flourishing of the Cro-Magnon peoples in their Eur-Asian homeland, the climate was largely benign, if affected by the ever-presence of the glaciers. Students of the climate of this period believe that winters were largely autumnal in character, rarely venturing far below 32 degrees Fahrenheit, but also staying cool in mid-day. The summers were spring-like, never rising beyond the fifties to low sixties, Fahrenheit. Eurasia then had a rich ecology that attracted myriad species of large mammals, including humans. The good times ended when a continental climate suddenly set in about 12,000 years ago. Now the summers were hot, the glaciers in retreat north, the winters cold and snowy, difficult for the huge foragers to browse beneath snow and frozen ground. The forests came back, the mammoths, saber-toothed tigers, giant sloths, all disappeared.

Imagine the cultural shock. Some hung on, the ancestors of the Europeans. Others wandered beyond the next mountain to see what they could find. The only comparison one can make with the impact that these events probably had on these people is the more recent fate of the Amero-Indians. They had thousands of additional years to genetically groove their migratory way of life. And they did engage in terribly brutal tribal wars. The Americas were also the setting for a happy, exciting, and fulfilling existence. There was little of the agricultural grindstone and its organizational specializations of urban life. When the Europeans came to North America, this Amero-Indian happy go-lucky hunting life came to an abrupt end. Several hundred years later, the excitements of subsistence hunting have been replaced by the urban glitter of the gambling casino.

The descendants of the Cro-Magnons on their way south were given several thousands of years of breathing room, to learn to adapt to the new way of life along the rivers,

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Tigris/Euphrates, Nile, Danube, Indus, and along the Mediterranean littoral. The same minds that quickly adjusted to the relatively mild and rich hunting ecology on the Eur-Asian plains, soon fabricated sickles to harvest the wild grains, cisterns to store the variable rains. In the north, hardly had their fossil bones appeared in the geological record, 45,000 B.P. then the art, the supple new technological devices, the rich decorative culture made itself known. It teaches us a lesson, that we should remember, smart people learn quickly. Far back in time, in the north, 45,000-25,000 years ago, they had figured out the technology of fire hardened pottery, even making chronometric markings, as modern hunters do, to record the number of nights between the full moons.

Civilization is complexity amidst the almost constant change produced by talented individuals. These talents can show themselves as metallurgists, military and weapons innovators, irrigation engineers, town planners and wall builders. Shamans and poets, musicians and jewelers, beauticians and clothes designers, were hardly in the rear. In the lands to the south of the frigid winters, along the rushing river banks, the sparkling shores of the Mediterranean, it all began. This was a world that attracted people, for the prosperity that beckoned. Riverine agriculture and herding, as well as some hunting, elephants still ran wild in Syria in Biblical times, Eighth century BCE, marked the change in their economic way of life.

At no time in this now pulsating urban setting was power so concentrated that any one group of military, political, or religious rulers, could stifle the natural, rhythmic flow of innovation. Highly intelligent civilizationally competent individuals in a now dynamic and complex urban social setting were stimulated to see ever new possibilities in the cultural web of meanings that surrounded him/her. Up north in the world of caves and a hunting economy, the simplicity and seeming permanence of this tough yet idyllic life, art and technology were infused with timeless rhythms. Change and progress, yes, but slower. In the south with so many different professions, occupations, crafts, the inputs from all directions, up and down the streets and alleys of the new towns, the humming stimulus was messaging the ready mind.

To live by a set of rules between individuals and the dynamic community, the laws and regulations of national life had to be

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open ended. To be able to discipline oneself for the sake of the common good requires one to think in terms of principles/ideas. Even in a relatively slow moving society such as Pharaonic Egypt, where both religion and political leadership over time became a given, protected from change by the ever nurturing but perennial laws of Mother Nile, there was still enough openness, breathing space for its 4-5 million people scattered along the hundreds of miles of the Nile and its deltas to allow for much innovation in art, technology, military adventurism, great architectural undertakings. These required generations of highly educated thinkers, who would find outlets for their imagination of the possible.

Contemporary liberal ideologists often complain about the aggressive expansionism of the Western world, the Caucasoids of Eur-Asia. And always, the complaint goes, this aggression was at the expense of the Third World, people of "color." Clearly no evidence exists that they were more war-like than other people around the world. Deep within human nature, regardless of intelligence levels, the war-making biological machine throbs. The West has subjected its own citizens to these juices of death as much as they have been used against distant peoples.

The power of the north lies in the same aggressive intelligence that produced the Sumerian writing system, the Old Testament, Euripides. Simply, it was the intelligence of the north that successfully expanded its reach, militarily, politically, and always genetically. In the book of unexpected outcomes, the losers were usually benefited by the fact that the victors loaned them a goodly amount of their victorious genes. In this way the peoples of the world gradually came closer to the norms of brain size and cultural competency that the revolutionary Cro-Magnons had first established for humankind.

How Biologically Determined is Human Nature?

To be scientific, we persuade ourselves that human intelligence is the handmaiden of practical survivalistic works. However, when we examine the fullness of achievement of societies that we can call civilizational, we usually draw up criteria that includes philosophy, intellectual religions, literacy in its poetic, dramatic exemplifications, literature. Not very practical, on face value.

Recently the term sociobiology has become very current in discussions of the practicalities of social behavior. So-called

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evolutionary psychology has added onto the dialogue as to the question of the biological substratum of human behavior including the inner life of culture, marriage and child rearing patterns. In the traditional "liberal" relativistic view these institutional patterns have been explained sociologically as accidental conventions, having only conventional values, no one society being "better" than another. For awhile, even the brutal treatment of women in the Muslim and Arab world was seen as a mere cultural convention, and if so, why not cannibalism, tribal magic, voodoo.

Sociobiology attempts to go below the surface of marriage, kinship patterns, and many other cultural traditions of different peoples to probe their biological implications for the survival of, individual, group, or nation. Altruism is a favorite human behavior to be explained in terms of its positive role in inducing reproductive and survivalistic outcomes that are consonant with the Darwinian struggle for survival and natural selection. Even mental illness has been explained as being part of the battle to achieve mastery and dominance in the social hierarchy. Here the losers turn their heads aside in sadness and defeat, and break down mentally. There are no end to the hidden selective values inherent in all human social behavior, according to much "pop" and serious sociobiological thinking.

The reason for its legitimacy within the scientific community is our mind's search for continuity in life and nature. If the Darwinian laws apply to animals, then they should also apply to humans. For, we are animals too. The trouble with this evolutionary extrapolation, the premise is incorrect. Just because we are animals does not necessarily mean that the trinity of Darwinian principles: variation, adaptation and natural selection, proceed along similar pathways for the rat, chimpanzee, and *Homo sapiens.*

It can be argued that the process by which humans evolved into their unique position in animal life was different than the pathway of most primates. Because of this evolutionary uniqueness, humans were endowed with an abundant repertoire of seemingly non-practical enthusiasms, music, poetry, romantic love. However, these differences do not violate Darwinian principles. Because of our special evolutionary pathway, the sociobiology of dogs and chimpanzees does not apply to us with the same determinism. A. R. Wallace, Darwin's friend and rival,

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stated the dilemma in a classical way. Why did *Homo sapiens* need a brain of 1600 cubic centimeters in size, when *Homo erectus* (Beijing Man/Java man) was surviving very well with a brain of 900 cubic centimeters. In answer, consider this: the line of humans culminating in *Homo sapiens sapiens* (Cro-Magnon) did not need the additional brain power to bring his young to reproductive maturity in the context of non-human rivals.

Intelligence, to be a biological adaptation of animal life for over a billion years, required a brain that was successful reproductively. Competing with other biological adaptations, from those of bacteria to paramecium, insects, intelligence over the long run was a highly successful adaptation. Mutations or variations in differing lines of animals kept appearing because of this success. Nature did not select them out into oblivion. Rather, they appeared and reappeared. With the primates they reached a point of unique power. These were animals who thought their way out of predicaments, rather then instinctually fleeing or fighting. What was even more dangerous, even a finale for some lines of animals, was the waiting for mutations to appear to refit a creature for a world in process of rapid change.

Humans were the most dynamic animals in terms of needing a brain that could instantly get them out of trouble. Beyond language, they had no special adaptations to help them survive. Even when they crossed that Rubicon which gave them a comfortable cushion of intellectual margin, to manage against all possible biological enemies and climatic/ecological threats, that 900 cm3 brain of Homo erectus, the mutations for larger and eventually highly reorganized primate brains kept on showing up. Low and behold, the usefulness of these bigger brains now showed itself in intraspecific competition with fellow humans. The more intelligent outbred less able people. They also used this higher intelligence to survive the potentially catastrophic events that would take place more often in the glaciating north. The invention of fire, the ability to migrate at will and find better climes, fabricate better tools to hunt, figure out that the southern side of the hill is to be preferred for greater winter warmth, and them to defend your spot in the sun, required tough "love."

All these skills and many more allowed the more able to bring babies into this world with ever larger head circumference and brains, to the limit of the ancient female hominid pelvis.

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That female structure was primeval in its formation as an upright primate, 4-5 mya. Our rapidly expanding human cortex was an expression of a radical and recent reconfiguration of the genus *Homo*.

What this expanding brain dragged along with it, was that ancient mammalian heritage of affect/emotion, the limbic system of the brain. It now roared with ever greater passion. In large brained humans these emotions were filtered through the cortex, carved stone, drama, the symphony, the Acropolis. We are thus only partially practical, sociobiological in our behavior. Heaven knows, our sexual passions are often blindingly powerful, insatiable, often brutal. But, under certain conditions they can be sublimated, as Freud argued, into religious or social celibacy, monogamy, even into a good book.

In the long run a large brain can lead to economic and political power, reproductive dominance. Much of the nether brain expanded along with the cortex as the brain swelled in evolutionary response to its usefulness for survival under elemental conditions. Thus, we have come through the tunnel as a very different primate, a creature, *Homo sapiens*, that is *sui generis*. We have, as many psychologists have suggested, an emotional brain as well as a cortical brain. Often, they can be in conflict, the ancient brain defeating the new. When this occurs it is usually because the challenges to an individual and his/her people are beyond the capacity of their cortical intelligence to master. It can be a combination of a brain of weakness, else the lack of knowledge to craft a functional response.

When the cortex is in the ascendancy, then, along with political/military stability, technological progress and/or leadership, the arts can flourish. The lower brain provides the juices which flow through the cortex in an explosion of creativity. For the human species, this situation is both mysterious and challenging.

Below the Bar

The real story of Homo's long hegira through evolutionary history is the ever greater dominance of the adaptive powers of intelligence. We rule the roost here, and practically all other forms of life are in retreat, if not in actual extinction, then on the edge. The bacteria certainly send forth challenges to our survival, and will probably do us in, in the long run. Insects too, seem relatively impervious to the clouds of poisons and toxins

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that we unleash on them to ward off their insistent evolutionary statements.

Our revolution is not complete. Levels of intelligence throughout the world are extremely variable. Ideological liberals can rail at I.Q. tests, and assert the power of government through affirmative action and other leveling devices to create a truly multi-cultural world of diversity. But it is the intellectual diversity of our planet which will choke off their hollow assertions. In the impending collapse of our so-called "global civilization," it is the multiplying poor who will first suffer the pangs, thence to slip quietly from view.

History is replete with examples of human extinction. The tragic Tasmanians are an exemplar of an ancient human ethnicity brought suddenly into the modem world of the nineteenth century. Their tragedy was intellectual, a people who had yet to learn to make fire, relate sexual intercourse to pregnancy and childbirth, nevertheless they were humans, with emotions and affect, competent in their isolation, certainly less evolved intellectually. They would have survived if left alone. No ethnic group, in this swelling human tide, could then or now escape the civilizational reach of the cortex. The Tasmanians became extinct in mid-nineteenth century. They did leave many hybrid children, offspring of their own daughters and the English who came to that island. The English settlers destroyed the Tasmanian way of life. Not without the native peoples fighting furiously but vainly against the invaders.

The Australian aboriginal peoples, likewise relatively untouched by the outside world before the Europeans arrived in the late-eighteenth century, have also left many hybrid descendants, there are but a few full blooded aboriginals left. Throughout the world the genes of the Eur-Asian Cro-Magnons have flowed outward in a domino effect to bring the cultural level of peoples closer together. Only in the Kivu forests of Africa, in the Philippine jungles, a few groups in India, New Guinea, South America, does the memory of a primeval hunting/gathering subsistence economy still endure.

Elsewhere, the direct descendants of the Cro-Magnons, are being increasingly supplicated to support the billions of humans who now live at the edge of the dominating cortical scientific/technological culture. The productive surplus of the West still makes possible the ever-increasing volume of life-

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support handouts for those at risk. The Third World has not and cannot through their own skills and organizational abilities enter this new world of plenty. The West gave them the political freedom to try to do it on their own. Parts of the Third World are still hanging by a thread because Western corporations have discovered valuable minerals, oil. For a few more decades these may help them survive as independent nations.

Liberal ideological dogma, including those international organizations such as the International Monetary Fund and the World Bank, whose existence is predicated on administering the redistribution of the wealth generated by intimidated and myopic First World taxpayers, still proclaim that the decline of the Third World is reversible. The difference between being developed and underdeveloped it is argued, is due to happenstance circumstance, accidents of climate, natural disasters, bad leaders, i.e. a panoply of myth.

All that is needed, these self-interested lobbies argue are a few more trillion dollars to be redistributed to the poor by the national and international philanthropic organizations, now located "close to the need" in beautiful buildings on lovely avenues in New York and Brussels.

The documentary evidence for this scenario is profuse, the entire western academy is hard at work churning out the fiction. Memory is short, the people, as with the heretical followers of Luther are not allowed to look at the originating manifestos and promises. Again, the same lame excuses, the same pleas for only a few more trillion dollars and all will be well. Now, a bit more Western social engineering and supervision, from afar. The library shelves are surfeit with such idealistic perorations, most hardly fifty years old. Will any one remember?

But consider the state of these populations on their native ground as the Europeans found them from the fifteenth to the nineteenth centuries. Already over the millennia small amounts of genetic contact had been made by adventurers from the West. In the case of Africa and the Islamic world, from the tenth century to today, massive importation of African slaves into the Arab nations. In sub-Saharan Africa, significant northern Caucasoid genes are to be found in the Ethiopians and Watusi, for example. There are Bushmanoid genes in the Negroid tribes of Southern Africa. From India to the East Indies can be found another mixture of Australid and Caucasoid racial strains,

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including Mongoloid migrant genes from the north. Most of these exchanges of genes and the amalgamation of the peoples of the world took place slowly and quietly. It is possible the Australian aboriginals may have absorbed Caucasoid genes from a few wanderers who landed on that continent, thousands of years ago.

All the peoples of the world are contemporaries. They have shared the planet for several million years, at the least. However, there was a steady diffusion of northern genes over the last several hundred thousand years that moved all human groups to at least the borderland of sapiency.

Tribal life was basically a stagnant one. From time to time an individual of exceptional genetic intelligence could move the group to a higher plateau of social and economic competency. But then, again, renewed stagnancy set in, the cultural patterns, the social hierarchy rigidly encapsulated by magic, totem and taboo. Here there could be no individual egress from the established cultural and economic order.

The coming of the Eur-Asians led almost invariably to the dissolution of tribal cultures. These so-called primitive subsistence peoples could not easily adapt to the dynamic and abstract symbolic ways of the West. When imported as slaves into the more developed literate cultures, they could not do other than bring these indigenous civilizations into decline. The immediate causes varied from concubinage, religious conversion and absorption, else becoming an excluded caste subject to terrible discrimination, sexual and economic exploitation, and ghettoization.

Researchers who deal with psychological and vocational issues involving psychometrics, the science of intelligence testing, have attempted to put numerical values on the results of such testing, by race and ethnicity. Using the European norm of 100 I.Q., Africans score between 70-75, Afro-Americans who have about 20-25 percent European genes, score between 82-85,

Northeast Asiatics, Japanese, Koreans and Han Chinese, we shall discuss them below, have I.Q.s of about 105. European (Ashkenazi) Jews have the highest I.Q. scores of any ethnic group, c. 115. I.Q. Such scores serve to predict achievement in education and then, vocational competency. In general I.Q. has proved to be the most validated technique in the panoply of social science theory.

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Today, in the West, there is a concerted attempt to belittle I.Q. testing and follow-up use. However, in certain professions where predictions of success or failure can be a life or death affair, pilots, the technological frontier, physical sciences, parts of the military, these tests are still being quietly utilized. Sadly, professional schools such as in medicine, law, have borne a heavy burden in abandoning the results of such testing in the formerly merit based decision making process. The socio/politics here is, to favor a quota policy fostering "cultural diversity" in the professions.

The Mysterious Far East

To understand the seemingly surprising intelligence profiles of the Northeast Asiatics one must briefly describe the ethnic situation at the dawn of human history, 3000 BCE. Many scientists accept the fact that the Negroids of Africa seem to be most closely related biologically, to the Caucasoids. One explanation is that the then very small West African Negroid populations had been genetically "touched" by wandering Cro-Magnid type Caucasoids at a very ancient point, perhaps 10,000-15,000 or more years ago. This seems to have separated these hybrid Negroids from even more primeval peoples, later driven into the deepest recesses of the rain forests, to become the pygmy populations, today on the verge of extinction.

Throughout Africa at that time were Bushman-like peoples, who may have moved as far north as southern Spain. We may never fully understand the vulnerability of this once wide spread race, the Capoids, to the incursions of the Caucasoids at the end of the Ice Ages. They were driven south by both advancing races, Caucasoids and Negroids, and into the Kalahari desert areas. They had lived for eons in this southern African ecology before the modem expansion of the above two races. The Hottentots, a hybrid (Negroid/Capoid) people as well as the Bushman are today on the verge of being completely absorbed by the expanding African Negroid populations. They have already been moved from their shrinking homelands to compounds where, as with the nineteenth-century Tasmanians they are likely to disappear as a racial entity, but not without leaving their genes in the larger population. The people from Nelson Mandela's Xhosa language group have much Capoid blood.

The Capoids have a coloration that is light-brown and an epicanthic eye fold very similar to the Mongoloids. Capoid

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ancestors may have moved out of Africa from as much two million years ago. Fossils similar to those found in Africa at this time level have been found in the Republic of Georgia, in the Caucasus, dating to 1.6 million years ago. From there it could have been a several thousand year trek to China. In this early stage of human evolution posiibly 2-1 million years ago, the Mongoloid ethnicity was a distinct minority in southern and eastern Asia. Most of the people were Australid types, New Guinea and Australian aboriginal natives, the root component of the hybridized populations of Southeast Asia. These Australids were also very early migrants from Africa who spread out throughout this sub-tropical zone and flourished mightily, *Pithecanthropus javanensis* – Java Man, 900,000 BP.

Toward the end of the Ice Ages, c.50,000 years ago, there seems to have started a push south, of Mongoloids, who gradually interbred with the Australid ethnicities and created the various Malaysian, Indonesian, Philippine, ethnicities. Indeed, there was at the same time a probable move eastward of Caucasoid types, Cro-Magnon and Cro-Magnon/Neanderthaloid hybrid people. Possibly, even the continental Australian and Papuan New Guinea aboriginal peoples could have absorbed small doses of foreign Eur-Asian genes. People wandered, even at the *Homo erectus* stage of human development. Thus these early sapiens migrations ought to be factored in.

The Amero-Indians crossed Central Asia to migrate over Beringia, the land bridge to the Americas, before the end of the Ice Ages, c. 15,000 B.P. They probably started their wanderings as Caucasoids utilizing a Cro-Magnon-like technology – bow and arrows, spears. They encountered resident Mongoloid and northern Australid peoples, absorbing their genes as they moved east. The very diversity of the Amero-Indian peoples argues that these many groups at first were small in numbers, bands or small tribes. The "highways" west to east in those eons were busy. The land was relatively flat, and the indigenous populations thinly spread out because of the difficult climate, although filled with good hunting prospects. As always with mammals, the primeval urge to move out was the goad.

In this way the resident Mongoloid/Australid populations were well enfiladed with foreign genetic elements. It is fair today to say that most contemporary Mongoloid peoples are tri-racial hybrids. We have evidence of Germanic/Celtic like peoples

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advancing to the eastern borders, Tarim Basin, of Xinjiang Province in China, at a date of about 2000 BCE. The Indo-European dialect of Tokharian was spoken in this province until about 900 CE, when Turkic people moved into this area, then later, Han Chinese. The Chinese mythic histories have always recognized that their formation as a people involved the intermixing of light haired blue/green eyed people from the West, with the resident black haired people of the south, e.g. the Yangtze and beyond, as in the Pazyryk graves.

If one travels to the Yellow River valley capital of ancient imperial China, Xian, one will find the museum of the terra-cotta soldiers. This was the then-resident emperor's humanitarian means to insure his safety and comfort in death, attended by his horse-riding soldiers. The date is 300-200 BCE. Long before, c.2000-1500 BCE the first Chinese Dynasty, the Shang set itself up in this Yellow River area. These invaders from the west arrived with Indo-European style chariots. They brought literacy to China. Some scholars see the evolution of Chinese orthography, the written form of the language, as having an odd similarity to certain early West Eurasian forms of writing, including possibly even the 'later' Nordic runes. The above-noted fair Caucasoid wanderers were in the east central Eurasian area at roughly the same early period.

The terra-cotta soldiers of Xian, 300-200 BCE were defenders of a dynasty which could then trace its history back 1500 years, to the literate Shang. Today, the contemporary Han Chinese rulers of Xian flatly agree that these soldiers were not Han. They were taller, 5' 10", in height with a definitely hybrid physiognomy, very similar to contemporary Kazahks, a mixture of Mongoloid/Caucasoid genetics. Some of these genes subsequently, post-"Chu," 200 BCE, made their way south in China.

Consider the Japanese and Koreans. Both ethnicities arrived at about the same time in their respective lands interestingly also, c.300-200 BCE. They probably traveled a more northern route across Siberia and Mongolia, and thus could have avoided the warriors of Xian. The Koreans might be described as the "Japanese who stayed home." They both speak a language related to the Uralic/Altaic group, to Finnish, Hungarian, and the Turkic languages of Central Asia. To my mind they undoubtedly began their overland journey to the East as

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Caucasoids, picking up Mongoloid genetic elements as they traveled, fought, and ultimately triumphed. As with the Xian Chinese, the Koreans/Japanese found a Malayo-Polynesian type peoples in the lands of ultimate destiny. They subdued these indigenous people, interbred with them to form their contemporary ethnic profile. The Japanese and Koreans, as with the Chinese, are also a tri-racial hybrid people.

All these warrior wanderers engaged in elite concubinage and polygyny, as with the Arab elites to the west. All of these groups have created new hybrid racial/ethnic profiles. The great Arab civilizational achievements began to wane in the thirteenth century CE, after the impact of their industrial scale importation of slaves from sub-Saharan Africa. By contrast, the clear success and power of the Northeast Asiatics in creating an extraordinary vigorous civilizational tradition, one without the heavy theological baggage of the three Western faiths, is evident. How these three Northeast Asiatic ethnicities created the social institutions which facilitated an ever-upward curve of cognitive achievement, in spite of clear historical institutional impediments, in the case of China, making it a walking mat of the West for many generations, needs to be studied.

To the south we find nations and ethnicities of variable civilizational development. The Vietnamese are competitors to their northern Chinese neighbor, but smaller and weaker. Southeast Asia still reveals traces of former Australoid and Negrito populations. The Thais received their literacy a bare five to six hundred years ago, parallel with increased Chinese and Indian (Caucasoid) immigration. From the seventeenth century the Chinese migrated in large numbers, to Taiwan, Philippines, Indonesia, Malaysia, and what is today Singapore. In the nineteenth century many Chinese and Japanese migrated to the Americas. In the twentieth century the Koreans have moved in large numbers, especially to the United States. When they arrived as immigrants in the lands that received them, they were poor, escaping the poverty and chaos in the homeland.

Every area to which these three ethnicities have migrated, they now constitute socially advancing minorities, in Singapore the Chinese are now the majority ethnicity. In Indonesia, for example, barely one percent of the population, they control about 80 percent of the non-state-owned wealth. In Malaysia they are about 30 percent of the population, East Indians about

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10-15 percent, the ruling majority are indigenous Malayo-Polynesian ethnics. The prosperity of this latter nation is certainly due to the high level scientific and business communities of these non-native citizen minorities. In both Indonesia and Malaysia the Chinese population has been subject to vicious discrimination and persecution. Today overwhelmingly Chinese Taiwan and Singapore are among the most advanced nations on this planet, and they are both democratic, secular, scientific societies.

The Northeast Asiatics prosper, contribute, wherever they live. Their home countries, in spite of an historical backlog of tyrannical class exploitation, war-lordism, communist totalitarianism, now seem to be in the vanguard. Western corporations are falling all over themselves to establish in these nations both to produce high technology for the outside world as well as to be sold to the increasing percentage of the middle class. Where else in the world can a company obtain highly skilled, ever learning workers, for the pittance in wages that is their inheritance of overpopulation and exploitation. The joke in Cambridge, Massachusetts is that the acronym MIT, ought not stand for "Massachusetts Institute of Technology," rather, "Made In Taiwan," because of the many students of Chinese ethnicity. The Juilliard School of Music, in New York City, one of our elite institutions, has a majority of students made up of these three Asiatic ethnicities. Why does the music of the West have so much fascination for these oriental students who have their own classic performing arts? Why are they so superior at it? Western music has never claimed to be a universal cultural form, as do the symbolic languages of mathematics, science, technology!

Conclusion

High human intelligence was a hard-earned gift, after much death and suffering. It was created as a product of a struggle with Mother Nature. First it was concentrated in the survivors of the northern glaciers, people of bleached skin, light-colored hair, and often blue-green eyes. High cortical, abstract intelligence is focused in our genetics. This biochemistry was/is not fundamentally incompatible with humans of other colorations then living in softer southern climes.

That it has been powerfully passed into racially hybrid peoples such as the three Northeast Asiatic ethnicities, confirms the fact that high intelligence is not the monopoly of any one

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race/ethnicity. The Caucasoid whites could lose it, if they are not already on a slippery slope. It depends on whose genetic biochemistry passes into the next generation.

Intelligence and its behavioral correlates – movement, curiosity, memory, prediction – has been a slowly advancing adaptation in the history of life forms for almost two billion years. As long as there is dynamic environmental, ecological, and now cultural change, it will carry a selective Darwinian premium.

What occurs within the human community over a period of several hundred years will not be registered in sidereal history. A vast mesmerizing crash of our international culture would only slow up the advance of high intelligence on our Earth. Evolution's shortest time spans are counted in millennia, not centuries.

A hundred million generations or so down the line loom the insects and bacteria.

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David Starr Jordan on the Dysgenic Effects of Dysfunctional Culture

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David Starr Jordan, Chancellor of Stanford University, typified the positive eugenicists who were writing at the beginning of the Twentieth Century. In the light of modern genetics it is reasonable to say that he accurately identified the importance of reproductive selection in determining the destiny of any breeding population, and drew attention to the fact that while culture came into existence as a factor which helped promote the survival of the population which possessed it, culture can also be dysfunctional and exert dysgenic pressures on those who adhere to value systems which run counter to nature's law of survival of the fittest.

Key Words: Evolution, culture, selection, dysgenics, intelligence, war, Catholicism, celibacy, primogeniture

One of the first to scholars to stress the dysgenic aspects of modern warfare was David Starr Jordan (1851-1931), a biologist who served as President of Indiana University (1875-1892), president of Stanford University (then known as Leland Stanford Jr., University) (1891-1913) and later as Chancellor of the same university (1913-1916).

Jordan's approach to eugenics was characteristic of the mainstream position at the beginning of the Twentieth Century. He emphasized positive eugenics, favoring an increase in the fertility rate of the fitter members of society rather than attempts to eliminate inferior genes from the gene pool. His positive eugenics concentrates specifically on nations as breeding units. And he uses the term "race" to refer to both human subspecies and to the human species as a whole. In fact, without prevarication he uses "race" to refer to any phylogenetic continuum. He also saw every generation as a genetic bottleneck in the course of which selection, either eugenic or dysgenic, determines which genes will be passed on to future generations.

Thus, in *The Blood of the Nation* (1903)[1], Jordan commences

[1] The quotations which follow up until the sub-heading *The Dysgenic Effects of War* are all excerpted from *The Blood of the Nation*. After that subheading, they are excerpted from his later *War and the Breed* (1915).

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his test with the assertion that:

> In this paper I shall set forth two propositions: the one self-evident; the other not apparent at first sight, but equally demonstrable. The blood of a nation determines its history. This is the first proposition. The second is: the history of a nation determines its blood.
>
> The present character of a nation is made by its past history. Those who are alive to-day are the resultants of the stream of heredity as modified by the vicissitudes through which the nation has passed. This stream flows in the veins of those who survive. Those who die without descendants can not color the stream of heredity. It must take its traits from the actual parentage.

Some of today's readers might quibble at Jordan's use of the term "blood" to refer to heredity, but it must be understood that this is an ancient symbolism, dating back to classical Greece and Rome, and Jordan takes care to explain that:

> The word "blood" in this sense is figurative only, an expression formed to cover the qualities of heredity. Such traits, as the phrase goes, "run in the blood." In the earlier philosophy it was held that blood was the actual physical vehicle of heredity, that the traits bequeathed from sire to son as the characteristics of families or races ran literally in the literal blood. We know now that this is not the case. We know that the actual blood in the actual veins plays no part in heredity, that the transfusion of blood means no more than the transposition of food, and that the physical basis of the phenomena of inheritance is found in the structure of the germ cell and its contained germ-plasm.
>
> But the old word well serves our purposes. The blood which is "thicker than water" is the symbol of race unity. In this sense the blood of the people concerned is at once the cause and the result of the deeds recorded in their history.

This last sentence, in which Jordan refers to blood as the symbol of "race unity," is characteristic of the Anglo-Saxon eugenicists of his period who were inspired by a deep-rooted sense of loyalty to their own bloodline, and sought to ensure a better future for their descendants. This was not a sentiment to be despised, for the same people who espoused the importance of conserving the fittest genetic stock were also concerned with preserving the best elements of the environment. The

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eugenicists were the pioneers of environmental conservation – anxious to leave future generations not merely the best possible selection of genes but also the best possible environmental heritage. In America, as in England, many of the earliest moves towards conservation (such as Muir Woods in California) were due to the efforts of eugenicists such as Jordan and his associates. And while expressing prior concern for their own kinsmen, and seeking to preserve Nature's rich endowments in their own homelands, they did not ignore the genetic welfare of humanity as a whole, although they realized that Darwinian competition took place between competing populations, not just between individuals.

As to Jordan's claim that the history of a nation determines its genetic character, this is to be seen as a reference to selection. Breeding populations, or races as he preferred to call them, do not remain genetically constant through time – indeed, if they did, evolution could not have taken place.

But Jordan is fully aware that although any species which had survived up to the present day did so only because it had been subjected to the beneficial effects of natural selection, the history of life on this earth is replete with extinct or failed species – species which experienced an inadequate degree of positive or eugenic selection. He also realized that in the case of mankind, culture can either promote the intergenerational survival of a specific population or it can exert dysgenic selective pressures which will lead to the eventual extinction of that population. Thus, commenting on the power of culture to modify the expression of the genes, he observed that:

> ...education may intensify their powers or mellow their prejudices....but these [cultural] traits and their resultants, so far as science knows, do not "run in the blood," they are not "bred in the bone." Older than climate or training or experience are the traits of heredity, and in the long run it is always "blood which tells."

But by this statement Jordan did not mean that culture could not promote dysgenic trends that might prove fatal to a breeding population. His whole argument was that while genes are not affected by cultural influences, cultural forces which discourage eugenic reproduction in favor of dysgenic reproduction can result in the elimination of survival-oriented

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genes from a gene pool. A continuation of this process through the generations, can even lead to the extinction of a population.

Dysgenic Trends Can Result from Dysgenic Culture

Indeed, Jordan's prime theme is the importance, for the intergenerational survival of any race or breeding population, that those best equipped with genes that favor survival should reproduce the more prolifically. If those equipped with superior genes (genes which equipped the individual with the best chance to live and pass on those genes) fail to survive and reproduce due to a dysgenic culture, then devolution occurs instead of evolution. Thus he continues:

> On the other hand, the deeds of a race of men must in turn determine its blood. Could we with full knowledge sum up the events of the past history of any body of men, we could indicate the kinds of men destroyed in these events. The others would be left to write the history of the future. It is the "man who is left" in the march of history who gives to history its future trend. By the "man who is left" we mean simply the man who remains at home to become the father of the family as distinguished from the man who in one way or another is sacrificed for the nation's weal or woe. If any class of men be destroyed by political or social forces or by the action of institutions, they leave no offspring, and their like will cease to appear.

Jordan continues:

> For a race of men or a herd of cattle are governed by the same laws of selection. Those who survive inherit the traits of their own actual ancestry.

To explain how selection works on human beings, he draws an analogy with the breeding of domesticated animals, then better understood by a population closer to the realities of nature than today's urbanized populations:

> [In a] herd of cattle, to destroy the strongest bulls, the fairest cows, the most promising calves, is to allow those not strong nor fair nor promising to become the parents of the coming herd. Under this influence the herd will deteriorate, although the individuals of the inferior herd are no worse than their own actual parents. Such a process is called race degeneration, and it is the only race degeneration known in the history of cattle or

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> men....On the other hand, if we sell the rough, lean, or feeble calves, we shall have a herd descended from the best. ...
>
> In selective breeding with any domesticated animal or plant, it is possible, with a little attention, to produce wonderful changes for the better. Almost anything may be accomplished with time and patience. To select for posterity those individuals which best meet our needs or please our fancy, and to destroy those with unfavorable qualities, is the function of artificial selection. Add to this the occasional crossing of unlike forms to promote new and desirable variations, and we have the whole secret of selective breeding....In the world of man similar causes produce similar results.
>
> Heredity carries with it possibilities for effectiveness...The change in the blood which is the essence of race-progress, as distinguished from progress in civilization [culture], finds its cause in selection only.....The evolution of a race is selective only.... From the actual parents actual qualities are received, the traits of the man or woman as they might have been, without regard, so far as we know, to the way in which these qualities have been actually developed.

Breeding Destruction

Jordan was deeply concerned about the effects of dysgenic selective behavior by any one generation on the future on the future quality of the gene pool to which they belonged. Thus he continues:

> No race as a whole can be made up of "degenerate sons of noble sires." Where decadence exists, the noble sires have perished, either through evil influences, as in the slums of great cities, or else through the movements of history or the growth of institutions. If a nation sends forth the best it breeds to destruction, the second best will take their vacant places. The weak, the vicious, the unthrifty will propagate, and in default of better will have the land to themselves.

In his 1915 study, *War and the Breed*,[2] published in the second year of World War I, Jordan foretold the genetic disaster which would strike the nations of Europe as a result of the unimaginably extensive bloodshed of the fittest and best in that

[2] *War and the Breed*, David Starr Jordan, has been reprinted and is available from Scott-Townsend Publishers, Box 34070, Washington DC 20005, socecon@aol.com

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maddest of wars. But he already foresaw the dangerously selective nature of modern warfare in 1903, when he turned to the example of France, a nation sadly weakened by the heavy bloodletting of the French Revolution and the ensuing Napoleonic Wars. Indeed, these two events were further augmented by two centuries of foreign empire-building activities, which took many of France's most enterprising young men to tropical regions where they succumbed to disease before they could pass on their genes to their nation's posterity:

> In our discussion of decadence we turn to France first simply as a convenient illustration. Her sins have not been greater than those of other lands, nor is the penalty more significant. Her case rises to our hand to illustrate a principle which applies to all human history and to all history of groups of animals and plants as well. Our picture, such as it is, we must paint with a broad brush, for we have no space for exceptions and qualifications, which, at the most, could only prove the rule. To weigh statistics is impossible, for the statistics we need have never been collected. The evil effects of "military selection" and similar causes have been long recognized by students of social science, but their ideas have not penetrated into the common literature of common life.
>
> ...survival of the fittest in the struggle for existence is the primal cause of race-progress and race-changes. But in the red field of human history the natural process of selection is often reversed. The survival of the unfittest is the primal cause of the downfall of nations.
>
> Let us see in what ways this cause has operated in the history of France.
>
> First, we may consider the relation of the nobility to the peasantry, the second to the third estate.
>
> The feudal nobility of each nation was in the beginning made up of the fair, the brave, and the strong. By their courage and strength their men became the rulers of the people, and by the same token they chose the beauty of the realm to be their own.

At this point Jordan made a unique distinction between the genetic history of Britain and that of the nations of continental Europe. His theme in this respect has no bearing in modern times, but had some truth in respect of the demographic history of the European peoples in the second millennium, that is to say

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in the thousand years which preceded the age in which he was writing. The Anglo-Saxon nations (an expression then commonly used to refer to Britain, America and the white British dominions then inhabited primarily by persons of British descent) had benefited genetically because of their adherence to the rule of inheritance by primogeniture:

> The gain of primogeniture came in the fact that the younger sons and the daughters' sons were forced constantly back into the mass of the people. Among the people at large this stronger blood became the dominant strain. The Englishmen of to-day are the sons of the old nobility, and in the stress of natural selection they have crowded out the children of the swineherd and the slave.
>
> Thus these younger sons became the Roundhead, the Puritan, the Pilgrim. They swelled Cromwell's army, they knelt at Marston Moor, they manned the "Mayflower," and in each generation they have fought for liberty in England and in the United States. Studies in genealogy show that all this is literally true. All the old families in New England and Virginia trace their lines back to nobility, and thence to royalty. Almost every Anglo-American has, if he knew it, noble and royal blood in his veins. The Massachusetts farmer, whose fathers came from Plymouth in Devon, has as much of the blood of the Plantagenets, of William and of Alfred, as flows in any royal veins in Europe. But his ancestral line passes through the working and fighting younger son, not through him who was first born to the purple....When we consider with Demolins "what constitutes the superiority of the Anglo-Saxon," we shall find his descent from the old nobility, "Saxon and Norman and Dane," not the least of its factors.
>
> On the continent of Europe the law of primogeniture existed in less force, and the results were very distinct. All of noble blood were continuously noble. All belonged to the leisure class. All were held on the backs of a third estate, men of weaker heredity, beaten lower into the dust by the weight of an ever-increasing body of nobility. The blood of the strong rarely mingled with that of the clown

The bloodletting of the French Revolution dramatically weakened the genetic quality of the French nation, for during the Reign of Terror not only did the nobility die, but thoses who rose up to resist the revolutionaries also perished, along with

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some of the very leaders of the revolution.

> And since that day the "best that the nation could bring" have been without descendants, the men less manly than the sons of the Girondins would have been, the women less beautiful than the daughters of Lamballe. The political changes which arose may have been for the better; the change in the blood was all for the worse.

But even before that the Catholic church had persecuted and caused the slaughter or migration of many of the creative elements of the French population which had sought to reform the tyranny and corruption of the old Church.

> Other influences which destroyed the best were social repression, religious intolerance, and the intolerance of irreligion and unscience. It was the mob of Paris which destroyed Lavoisier, with the sneer that the new "republic of reason" had no use for savants. The old conservatism burned the heretic at the stake, banished the Huguenot, destroyed the lover of freedom, silenced the agitator. Its intolerance gave Cuvier and Agassiz to Switzerland, sent the Le Contes to America, the Jouberts to Holland, and furnished the backbone of the fierce democracy of the Transvaal. While not all agitators are sane, and not all heretics right-minded, yet no nation can spare from its numbers those men who think for themselves and those who act for themselves. It cannot afford to drive away or destroy those who are filled with religious zeal, nor those whose religious zeal takes a form not approved by tradition nor by consent of the masses.

Jordan's speculations on dysgenic forces operating in history also included the hypothesis that the Catholic Church's insistence on the celibacy of its priests had a dysgenic impact on the European peoples. For centuries, in Catholic Europe, a career in the Church provided the prime opportunity for the brighter members of the lower classes to rise socially. But the genetic cost was heavy, for it meant that the brighter were constantly being attracted to a profession which forbade them to pass on their genes to future generations. The demand for celibacy of the priesthood imposed by the Catholic Church was highly dysgenic.

Charity can be Dysgenic

Jordan warned that charity can have a dysgenic impact when

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it promotes reproduction amongst the less competent members of a society, thereby negating the principle of natural selection.

> In the course of eons of evolution, Nature so arranged matters that only the fittest survived, whereas modern human cultures tended to practice charity indiscriminately, and so promote the survival and reproduction of those who might otherwise have failed to pass on their genes to future generations.
>
> Indiscriminate charity has been a fruitful cause of the survival of the unfit. To kill the strong and to feed the weak is to provide for a progeny of weakness. It is a French writer, again, who says that "Charity creates the misery she tries to relieve; she can never relieve half the misery she creates."

He also drew attention to the now well-established fact that in historical times urban societies tended to produce fewer offspring than rural communities, and that since urban societies tended to draw away the more intelligent from the rural areas, this too could be dysgenic. His observations in this respect do not necessarily hold true of the modern welfare societies of the Western nations.

> The concentration of the energies of France in the one great city of Paris is a potent agency in the impoverishment of the blood of the rural districts. All great cities are destroyers of life. Scarcely one would hold its own in population or power, were it not for the young men of the farms.
>
> In such destruction, Paris has ever taken the lead. The education of the middle classes in France is almost exclusively a preparation for public life. To be an official in a great city is an almost universal ideal. This ideal but few attain, and the lives of the rest are largely wasted. Not only the would-be official, but artist, poet, musician, physician, or journalist, seeks his career in Paris. A few may find it. The others, discouraged by hopeless effort or vitiated by corrosion, faint and fall. Every night some few of these cast themselves into the Seine. Every morning they are brought to the morgue behind the old Church of Notre Dame. It is a long procession and a sad one from the provincial village to the strife and pitfalls of the great city, from hope and joy to absinthe and the morgue.
>
> With all its pitiful aspects the one which concerns us is the steady drain on the life-blood of the nation, its steady lowering of the average of the parent stock of the future.

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The Dysgenic Effect of War

But in the light of the heavily selective dysgenic impact of modern warfare, Jordan is perhaps best remembered today for his *War and the Breed*, in which he writes:

> But far more potent for evil to the race than all these influences, large and small, is the one great destroyer – War. War for glory, war for gain, war for dominion, its effect is the same, whatever its alleged purpose.
>
> Not long ago I visited the town of Novara, in northern Italy. There, in a wheat-field, the farmers have ploughed up skulls of men till they have piled up a pyramid ten or twelve feet high. Over this pyramid some one has built a canopy to keep off the rain. These were the skulls of young men of Savoy, Sardinia, and Austria, –men of eighteen to thirty-five years of age, without physical blemish so far as may be, –peasants from the farms and workmen from the shops, who met at Novara to kill each other over a matter in which they had very little concern. Should the Prince of Savoy sit on his unstable throne or yield it to some one else, this was the question. It matters not the decision. History doubtless records it, as she does many matters of less moment. But this fact concerns us, here in thousands they died. The Frenchmen, Austrians, and Italians fell together at Magenta, in the same cause. You know the color that we call Magenta, the hue of the blood that flowed out under the olive trees. Go over Italy as you will, there is scarcely a spot not crimsoned by the blood of France, scarcely a railway station without its pile of French skulls. You can trace them across to Egypt, to the foot of the Pyramids. You will find them in Germany, at Jena and Leipzig, at Lutzen and Bautzen and Austerlitz. You will find them in Russia, at Moscow; in Belgium, at Waterloo. "A boy can stop a bullet as well as a man," said Napoleon; and with the rest are the skulls and bones of boys, 'ere evening to be trodden like the grass. "Born to be food for powder" was the grim epigram of the day. Read the dreary record of the glory of France, the slaughter at Waterloo, the wretched failure of Moscow, the miserable deeds of Sedan, the waste of Algiers, the poison of Madagascar, of Indo-China, the hideous results of barrack vice and its entail of disease and sterility, and you will understand the man who is left, the man whom glory cannot use, becomes the father of the future men of France.

The dysgenic effect of war is not limited to the loss of

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genetically healthy men, Jordan warns. When large numbers of such men are selected out of the national gene pool, many of their sisters and female kinsmen are denied the opportunity to breed from healthy stock, or to breed at all. The number of fine women left in Britain, France and Germany after World War I, and notably in Germany after World War II was testimony to his vision, based although his conclusions were on events prior to these two frightful bloodlettings.

> In the loss of war we count not alone the man who falls or whose life is tainted with disease. There is more than one in the man's life. The bullet that pierces his heart goes to the heart of at least one other. For each soldier has a sweetheart; and the best of these die, too – so far as the race is concerned – if they remain single for his sake.

Because wars tend to unite nations and heighten the sense of altruism amongst the nobler element in a nation, a number of intellectuals in Jordan's day actually praised war as a necessary evil. But Jordan repudiated such sentiments, and here it is worth including a lengthy quotation from his pen:

> Ruskin once said that "war is the foundation of all high virtues and faculties of men." As well might the maker of phrases say that fire is the builder of the forest, for only in the flame of destruction do we realize the warmth and strength that lie in the heart of oak....
>
> The final effect of each strife for empire has been the degradation or extinction of the nation which led in the struggle.
>
> Greece died because the men who made her glory had all passed away and left none of their kin and therefore none of their kind. "'tis Greece, but living Greece no more"; for the Greek of to-day, for the most part, never came from the loins of Leonidas or Miltiades. He is the son of the stable-boys and scullions and slaves of the day of her glory, those of whom imperial Greece could make no use in her conquest of Asia. " Most of the old Greek race," says Mr. W. H. Ireland,
>
> *has been swept away.*
> *Earth, render back from out thy breast*
> *A remnant of our Spartan dead !*
> *To make a new Thermopylae!*
>
> Why did Rome fall? It was not because untrained hordes

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were stronger than disciplined legions. It was not that she grew proud, luxurious, corrupt, and thereby gained a legacy of physical weakness. We read of her wealth, her extravagance, her indolence and vice; but all this caused only the downfall of the enervated, the vicious, and the indolent. The Roman legions did not riot in wealth. The Roman generals were not all entangled in the wiles of Cleopatra.

"The Roman Empire," says Seeley, "perished for want of men." You will find this fact on the pages of every history, though few have pointed out war as the final and necessary cause of the Roman downfall. In his recent noble history of the "Downfall of the Ancient World " (*Der Untergang der Antiken Welt*, 1897), Professor Otto Seeck, of Greifeswald, makes this fact very apparent. The cause of the fall of Rome is found in the "extinction of the best " (*Die Ausrottung der Besten*), and all that remains to the historian is to give the details of this extermination. He says, "In Greece a wealth of spiritual power went down in the suicidal wars." In Rome "Marius and Cinna slew the aristocrats by hundreds and thousands. Sulla destroyed no less thoroughly the democrats, and whatever of noble blood survived fell as an offering to the proscription of the triumvirate." "The Romans had less of spontaneous power to lose than the Greeks, and so desolation came to them all the sooner. He who was bold enough to rise was almost without exception thrown to the ground. Only cowards remained, and from their brood came forward the new generations. Cowardice showed itself in lack of originality and slavish following of masters and traditions." Had the Romans been still alive, the Romans of the old republic, neither inside nor outside forces could have worked the fall of Rome. But the true Romans passed away early. Even Caesar notes the "dire scarcity of men". Still there were always men in plenty, such as they were. Of this there is abundant testimony. Slaves and camp-followers were always in evidence. It was the men of "strength and character," the small farmers, "the hardy dwellers on the flanks of the Apennines," who were gone.

"The period of the Antonines was a period of sterility and barrenness. The human harvest was bad." Augustus offered bounties on marriage until "celibacy became the most comfortable and most expensive condition of life."

"Marriage," says Metellus, "is a duty which, however painful, every citizen ought manfully to discharge."

So fell Greece and Rome, Carthage and Egypt, the Arabs

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and the Moors, because, their warriors dying, the nation bred real men no more. The man of the strong arm and the quick eye gave place to the slave, the pariah, whose lot changes not with the change of dynasties.

Other nations of Europe may furnish illustrations in greater or less degree. Germany guards her men, and reduces the waste of war to a minimum. She is "military, but not warlike"; and this distinction means a great deal from the point of view of this discussion. In modern times the greatest loss of Germany has been not from war, but from emigration. If the men who have left Germany are of higher type than those who remain at home, then the blood of the nation is impoverished. That this is the case the Germans in Germany are usually not willing to admit. On the other hand, those competent to judge the German-American find no type of men in the Old World his mental or physical superior.

Switzerland is the land of freedom, the land of peace. But in earlier times some of the thrifty cantons sent forth their men as hireling soldiers to serve for pay under the flag of whomsoever might pay their cost. There was once a proverb in the French Court "Pas d'argent, pas de Suisses " (No money, no Swiss); for the agents of the free republic drove a close bargain.

In Lucerne stands one of the noblest monuments in all the world, the memorial of the Swiss guard of Louis XVI., killed by the mob at the palace of Versailles. It is carved in the solid rock of a vertical cliff above a great spring in the outskirts of the city, a lion of heroic size, a spear thrust through its body, guarding in its dying paws the Bourbon lilies and the shield of France. And the traveller, Carlyle tells us, should visit Lucerne and her monument, "not for Thorwaldsen's sake alone, but for the sake of the German Biederkeit and Tapferkeit, the valor which is worth and truth, be it Saxon, be it Swiss."

Beneath the lion are the names of those whose devotion it commemorates. And with the thought of their courage comes the thought of the pity of it, the waste of brave life in a world that has none too much. It may be fancy, but it seems to me that, as I go about in Switzerland, I can distinguish by the character of the men who remain those cantons who sent forth mercenary troops from those who kept their own for their own upbuilding. Perhaps for these reasons than this Lucerne is weaker than Graubunden, and Unterwalden less virile than little Appenzell. In any event, the matter is worthy of consideration; for this is absolutely certain – just in proportion

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to its extent and thoroughness is military selection a cause of decline.

Genetic Depletion in the Course of Tropical Adventures

But Jordan did not blame war and urbanization alone for dysgenics amongst the nations of Europe. He correctly identified European exploration into disease-ridden tropical lands and its constant attempts to colonize territories which were unsuitable for members of the white race, whose forebears had not been exposed to tropical diseases and thus had not immunity to such diseases:

> Holland has become a nation of old men, rich, comfortable, and unprogressive. Her sons have died in the fields of Java, the swamps of Achin, wherever Holland's thrifty spirit has built up nations of slaves. It is said that Batavia alone has a million of Dutch graves. The armies of Holland to-day are recruited in every port. Dutch blood is too precious to be longer spilled in her enterprises.
>
> Spain died of empire centuries ago. She has never crossed our path. It was only her ghost which walked at Manila and Santiago. In 1630 the Augustinian friar La Puente thus wrote of the fate of Spain: "Against the credit for redeemed souls I set the cost of armadas and the sacrifice of soldiers and friars sent to the Philippines. And this I count the chief loss; for mines give silver, and forests give timber, but only Spain gives Spaniards, and she may give so many that she may be left desolate, and constrained to bring up strangers' children instead of her own." "This is Castile," said a Spanish knight; "she makes men and wastes them." "This sublime and terrible phrase," says Lieutenant Carlos Gilman Calkins, from whom I have received both these quotations, "sums up Spanish history."
>
> The warlike nation of to-day is the decadent nation of to-morrow. It has ever been so, and in the nature of things it must ever be.
>
> In his charming studies of "Feudal and Modern Japan," Mr. Arthur Knapp returns again and again to the great marvel of Japan's military prowess after more than two hundred years of peace. It is astonishing to him that, after more than six generations in which physical courage has not been demanded, these virile virtues should be found unimpaired.
>
> What shall we say of England and her hundred petty wars "smouldering" in every part of the globe?
>
> Statistics we have none, and no evidence of tangible decline

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that English men will not indignantly repudiate. Besides, in the struggle for national influences, England has had many advantages which must hide or neutralize the waste of war. In default of facts unquestioned, we may appeal to the poets, letting their testimony as to the reversal of selection stand for what it is worth.

Kipling tells us of the cost of the rule of the sea:-

"We have fed our sea for a thousand years,
And she calls us, still unfed;
Though there's never a wave of all her waves
But marks our English dead."
If blood be the price of admiralty,
Lord God, we have paid it in full."

Again, referring to dominion on land, in the time of Queen Victoria, who reigned over the most extensive empire in history, he says:

"Walk wide of the widow of Windsor,
For half of creation she owns
We've bought her the same with the sword and the flame,
And we've salted it down with our bones.

Finer than this are the lines in the "Revelry of the Dying," written by a British officer, Bartholomew Dowling, it is said, who died in the plague in India:

"Cut off from the land that bore us,
Betrayed by the land we find,
When the brightest are gone before us,
And the dullest are left behind.
So stand to your glasses steady,
Tho' a moment the color flies;
Here's a cup to the dead already
And huzza for the next that dies I"

The stately *Ave Imperatrix* of Oscar Wilde, bright flicker of genius in a wretched life, contains lines that ought not to be forgotten :

"What matter if our galleys ride
Pine-forest-like on every main?
Ruin and wreck are at our side,
Stern warders of the house of pain.
Where are the brave, the strong, the fleet,
The flower of England's chivalry?
Wild grasses are their winding-sheet,
And sobbing waves their threnody.
Peace, peace, we wrong our noble dead

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To vex their solemn slumber so;
But childless and with thorn-crowned head
Up the steep road must England Go!

More than all who fall in battle or are wasted in the camps, the nation misses the "fair women and brave men" who should have been the descendants of the strong and the manly. If we may personify the spirit of the nation, it grieves most not over its "unreturning brave," but over those who might have been, but never were.

We have been told that the glories of Blenheim, Trafalgar, Waterloo, Majuba Hill, were won by real Englishmen. And this, in fact, is the truth.

There was once a time when the struggles of armies resulted in a survival of the fittest, when the race was indeed to the swift and the battle to the strong. The invention of "villanous gunpowder" has changed all this.

The feeling for the righteousness of the cause, "with the flavor of religion in it," says Charles Ferguson, "has made the volunteer the mighty soldier he has always been since the days of Naseby and Marston Moor."

If we go over the record of brave men and wise women whose fathers fought at Lexington, we must think also of the men and women who shall never be, whose right to exist was cut short at this same battle. It is a costly thing to kill off men, for in men alone can national greatness consist.

[The War between the States] cost us a million of lives. And this million, North and South, was the "best that the nation could bring." North and South, the nation was impoverished by the loss. There are relatively few of us left to-day in whose hearts the scars of forty years ago are still unhealing. But a new generation has grown up of men and women born since the war. They have taken the nation's problems into their hands, but theirs are hands not so strong or so clean as though the men that are stood shoulder to shoulder with the men that might have been. The men that died in "the weary time" had better stud in them than the father of the average man of to-day.

Read again Brownell's rhymed roll of honor, and we shall see its deeper meaning:-

"Allen, who died for others,
Bryan of gentle fame,
And the brave New England brothers
Who have left us Lowell's name;

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Bayard, who knew not fear,
True as the knight of yore,
And Putnam and Paul Revere,
Worthy the names they bore;
Wainwright, steadfast and true,
Rodgers of brave sea-blood,
And Craven, with ship and crew,
Sunk in the salt-sea flood;
Terrill, dead where he fought,
Wallace, that would not yield;
Sumner, who vainly bought
A grave on the foughten field,
But died ere the end he saw,
With years and battles outworn;
There was Harmon of Kennesaw,
And Ulric Dahlgren, and Shaw
That slept with his Hope Forlorn;
Lytle, soldier and bard,
And the Ellets, sire and son;
Ransom, all grandly scarred,
And Redfield, no more on guard.
But Alatoona is won"

So runs the record, page after page....And these were the names of the officers only. Not less worthy were the men in the ranks.

Doubtless one war will not necessarily ruin a nation. Doubtless it will not destroy its virility or impair its blood. Doubtless a dozen wars may do all this. The difference is one of degree alone; I wish only to point out the tendency. That the death of the strong is a true cause of the decline of nations is a fact beyond cavil or question. The "man who is left" holds always the future in his grasp.

One of the great books of our new century will be some day written on the selection of men, the screening of human life through the actions of man and the operation of the institutions men have built up. It will be a survey of the stream of social history, its whirls and eddies, rapids and still waters, and the effect of each and all of its conditions on the heredity of men. The survival of the fit and the unfit in all degrees and conditions will be its subject-matter. This book will be written, not roughly and hastily, like the present fragmentary essay, still less will it be a brilliant effort of some analytical imagination. It will set down soberly and statistically the array of facts which as yet no one possesses; and the new Darwin whose work it shall be must, like his predecessor, spend twenty-five years in the gathering of "all facts that can possibly bear on the question."

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> When such a book is written, we shall know for the first time the real significance of war ....it is bad, only to be justified a the last resort of "mangled, murdered liberty" a terrible agency to he evoked only when all other arts of self-defense shall fail.

World War I was perhaps the most ruinous war Europe has ever known, a war in which Jordan prephecied "the manhood of the race would be wasted as never before in human history, a war from which every nation concerned would awaken exhausted and humiliated for generations to come." Truly, while America missed much of the blood-letting of World War I, that war weakened the nations of Europe genetically to an extent that it is difficult for us to appreciate today. It also laid the foundations for World War II, which with its highly selective slaughter of the most talented combatants who served in front line capacities in the air, on the land, on the water, and under the water, finally reduced Europe to its present, some would say, comparatively effete condition.

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A Comment on Richard Lynn's "Eugenics: A Reassessment" Reviewed by Kevin Lamb in Volume XLII, No. 2

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The author reviews Richard Lynn's book *Eugenics: A Reassessment,* and challenges Lynn's claim that the Chinese have shown themselves to be superior in creative ability to the Caucasoids except since the Renaissance, and also Lynn's hypothesis that if the Chinese adopt eugenic policies and obtain worldwide hegemony, its leaders will necessarily evolve benevolent leadership to the peoples of other nations and races.

Key Words: Eugenics, intelligence, China, Europe, technological progress, global hegemony, Falung Gong, Mao, despotism.

The new treatise on *Eugenics: A Reassessment,* written by Richard Lynn and reviewed in the Winter 2001 issue of this journal, makes a powerful case for a serious reconsideration of the need for eugenic policies so that the deleterious outcomes of contemporary Western culture and the welfare state can be reversed. Founded by the brilliant Victorian polymath, Sir Francis Galton (1820-1911), the science of eugenics, boosted by major advances in our understanding of the human genome, is likely to reemerge as a serious item on the social and economic agendas of states in the twentieth first century. Whether politicians and egalitarian activists like it or not selection and intervention procedures for eliminating deleterious genes and for improving the quality of human beings are now possible and there is little that can be done to stop determined scientists and nation states from developing and using such techniques.

Informed readers of this article will be well aware that at the start of the twentieth century there was a consensus across the political spectrum that throughout the nineteenth century improved living standards had brought about a decline in the quality of the population of most Western nations and that something had to be done to arrest and to reverse this dysgenic trend. This consensus did not survive World War II. Thereafter, eugenics came to be regarded in the media as synonymous with genocide. Yet the basic problems identified by the early eugenicists have not gone away. They have, if anything, become

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worse, due in large part to the huge increase and extension of welfare provision in Western societies since 1945.

Writing in 1958 and refreshingly uninhibited by political correctness and multiculturalism, Aldous Huxley observed that:

> In this second half of the twentieth century we do nothing systematic about our breeding; but in our random and unregulated way we are not only overpopulating our planet, we are also, it would seem, making sure that these greater numbers shall be of biologically poorer quality. In the bad old days children with considerable, or even with slight, hereditary defects rarely survived. Today, thanks to sanitation, modern pharmacology and the social conscience, most of the children born with hereditary defects reach maturity and multiply their kind (Huxley, 1958, 15-16).

Huxley's assessment of dysgenic decline comes very close to that articulated by the Nobel Prize winner, William Shockley in the 1960s which led to his being targeted in a sustained, vicious and cowardly campaign of vilification. Others soon fell foul of the new Marxist orthodoxy, most notably Arthur Jensen in the USA, and Hans Eysenck in the UK.

The opponents of eugenics, insist that we must reject the notion that some genes are "bad" and others "good" on the grounds that such thinking involves massive value judgments. This is another manifestation of the intellectual relativism of our time applied to eugenics. It owes a great deal to Michel Foucault's *Madness and Civilization* (1961). Far more seriously, it will inflict unnecessary suffering on future generations of children. In passing, one should point out that the judgment that all genes are worthy of being valued is itself a value judgment and one that is based more on a desire not to be seen to be judgmental than on rigorous thinking. And as Lynn notes, once conceded that some genes are indeed undesirable, the way is becomes open for their removal via eugenics. So the defense mechanism is to impart equal value to all genes irrespective of their impact on the lives of individuals and thus attempt to close down any discussion of desirability. In this respect, one of the most important 2 studies cited by Lynn is that undertaken by Berit Brinchmann who wanted to assess the impact on parents having to live with severely disabled children (Lynn, 2001, 67-68). Brinchmann's study should be obligatory reading for

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advocates of the all-genes-are-of-equal-worth theory.[1]

But the most stimulating and disturbing aspects of *Eugenics: A Reassessment* are those that deal with the future of eugenic programs, as Lynn sees them, in the Far East. Central to the Lynn prognosis that China, Japan and other north-east Asian states will eventually eclipse the West in the twentieth-first century is the well documented finding that the citizens of these states, have, on average, a slightly higher IQ than Caucasians and that in the long run this will work to their educational, economic and military advantage.

There is a real paradox here. It can be stated thus: given the higher average IQ of Japanese and Chinese – and one has no reason to question the accuracy or the manner in which the data were gathered – how are we to account for the fact that the overwhelming majority of discoveries, inventions and achievements which have created the modern world are emphatically not of north-east Asian origin? One thinks here of the foundations laid by Greece and Rome and the later achievements from the fifteenth century onwards, of Brahe, Bruno, Copernicus, Kepler, Galileo, Hooke, Boyle, Newton, Leibnitz, Faraday, Pascal, Descartes, Goethe, Dostoevsky, Tolstoy, Solzhenitsyn, Spinoza, Einstein, Bohr, Schrodinger, Darwin, Turing and so the roll call of intellectual achievement goes on and on. The problem here for the Lynn thesis is the conspicuous absence of Japanese and Chinese contributions to these achievements. Japan, the world's second largest economy, has not made anything like the contribution to major scientific breakthroughs and discoveries, which, consistent with the Lynn thesis, one would reasonably expect to be the case. Compared to the size of its economy and the obvious intellectual capital that resides among its people, Japan's share of Nobel Prizes is exiguous.

We should bear in mind too that the Industrial Revolution and the subsequent Information Technology (IT) and computer revolutions did not begin in Japan or China. Again, consistent with the Lynn thesis one would expect that at least one of these major breakthroughs in the advance of mankind would have been made in north-east Asia. Nor was the new revolution in

[1] See Berit Brinchmann, "When the Home becomes a Prison: Living with a Severely Disabled Child", *Nursing Ethics*, 1999, Vol 6, pp.137-143.

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bioengineering and bio-robotics, which will work in tandem with IT, initiated in Japan or China. A bimodal distribution of IQ between whites and north-east Asians would strongly suggest a longer tail at the higher end of the bell curve distribution among north-east Asians, which would mean greater numbers in the higher IQ range. In practical terms, one would expect this to translate into the sort of intellectual achievements we associate with the West. Even with the slightly higher average IQ there seems to be no corresponding ability to make fundamental discoveries among north-east Asian populations, or at least not on the scale that one would expect, given the higher IQ, and at the critical mass needed for economic superiority.

In an article entitled "An East Asian Perspective on Eugenics" (*Mankind Quarterly*, Spring 2002, 42.3) Benjamin Wong writes as follows:

> "The East Asian – Caucasian IQ differential has posed a conundrum for many. If East Asians rank above whites in terms of IQ, then how is it possible that Caucasians are more "creative" and have led global development over the past few centuries? Various explanations have been proposed. The author notes that the following few paragraphs are largely speculative.
>
> First, East Asian IQs were somewhat similar to those of Caucasians until the past few decades. It was not until the 1970s that East Asians were found to have somewhat higher IQs compared to Caucasians. Prior to that, East Asians had equal and sometimes marginally lower IQs. Perhaps it was a combination of the dysgenic effect in the West and improved nutrition of the East post World War Two that tipped the balance. As such, Caucasians led till the middle of the 20th century, with Japan and other Far Eastern countries rising up towards the latter part of the century, as described by the phrase "the Far East economic miracle".

East Asian IQs have a somewhat narrower IQ distribution, or a smaller standard deviation. East Asians' IQs thus tend to be more clustered around the mean, similar to the distribution of female IQs. (To be fair, the present-day Caucasian distribution is wider in part because of the mixing of various racial groups that have a lower cognitive ability profile in the U.S., and this may accentuate the left tail of the Bell Curve rather than the right side, contributing to the observed increased standard deviation.)

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Nonetheless, assuming a symmetrical distribution with a wider standard deviation of the bell curve, there will be more Caucasian "creators" if the various "Prometheans" of society come from the most right-end tail of the IQ distribution. And this assumes that IQ correlates with creativity. If this theory is true, one should expect that the major leaps and paradigms in science will be set by Caucasians, while East Asians become good "secondary creators", furthering and refining scientific paradigms more effectively than Caucasians.

The obvious imbalance between northeast Asian IQ and achievement has two consequences. First, it is doubtful whether, on past performance, that China and Japan will dominate the world as Lynn believes. Despite the self-inflicted burden of multiracialism, Caucasians have historically demonstrated, and continue to demonstrate, remarkable achievement across the entire spectrum of physical and intellectual endeavor: from polar, naval and space exploration to physics, biology, computing, chemistry, art, literature, architecture, mathematics, the invention of the world's most important sports, to waging war, creating legal and financial systems and free markets. At any given time in history Caucasians might not be absolutely dominant in all these fields but they retain sufficient strength in depth across this spectrum to ensure – should they not lose that all important desire to win – that they will for the foreseeable future remain dominant in this impressive diversity across so many areas.

A second consequence of this discrepancy is, potentially, a serious challenge to the conclusions drawn on the basis of the average black and white IQ difference. If IQ is taken to be a reliable predictor of intellectual and economic achievement – and regarding the black/white IQ difference the data are powerful predictors – why is the same not true regarding north-east Asians? It is somewhat surprising that those who see IQ as some kind of racist fallacy have not highlighted this predictive anomaly in order to attack the data and conclusions drawn regarding the black/white IQ difference from a different direction.

Lynn believes that China and other northeast Asian states will be more likely to introduce eugenic programs because their governments are authoritarian and society's rights take precedence over individual rights. The message for Europe is

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gloomy. Unhampered by democratic considerations, China will push ahead with an ambitious eugenics program. China's military and economic might will grow and Europe, weakened by dysgenic policies, uncontrolled non-white immigration, racial strife and a political unwillingness to reverse these trends, will succumb to Chinese global hegemony (Lynn, 2001, 314).

The China-hegemony-thesis is worth examining in some detail. The comparison with the British empire's methods of colonial rule is suspect. For the presence of the British was beneficial, even if after their colonial withdrawal, much of Africa relapsed into the brutal primitivism which characterized it before European colonization. China's genocidal policies against Tibet, forced abortions inflicted on Tibetan women very late in pregnancy, and their treatment of the Uighers of Chinese Turkestan, and of Chinese dissenters such as Falung Gong and Christians, do not inspire any confidence in the prospect of Chinese global hegemony. Lynn's view that Chinese global domination would initiate a period of world peace (Lynn, 2001, 316) is, I suggest, of the same order of wishful thinking that motivated nineteenth-century economic liberals to assert that such was the fantastic growth in prosperity and peaceful trade in the nineteenth century that wars were a thing of the past; that men of goodwill could always settle problems without recourse to war. Such optimism was put to death between 1914-1918, which in a very real sense marked the end of the nineteenth century.

Strangely, for all his hard-headed, realistic analysis of dysgenic decline in the West, and his powerful presentation of the underclass problem, Lynn demonstrates a touching confidence in the rationality and benevolence of future Chinese governments which is perhaps overly optimistic when one examines the historical record. In the twentieth century, Mao's China was responsible for the greatest act of mass murder in recorded history, the Terror Famine of the 1950-1960s. Deaths directly attributed to Mao's own policies are estimated to be between 20,000,000 and 43,000,000. Since 1988, the Chinese communist party has accepted 20,000,000 as the official figure (Courtois et al, 1999, 495). With such contempt for the lives of their own people, it is difficult to have any confidence in Lynn's optimistic assertion that:

The Chinese will be aware that while they and other Oriental

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> peoples have a higher average intelligence, the European peoples have a greater capacity for creative achievement, probably arising from a higher level of psychopathic personality, enabling them more easily to challenge existing ways of thinking and to produce creative innovations. This will be part of human genetic diversity that the Chinese will be keen to preserve and foster (Lynn, 2001, 317).

To this, Chinese totalitarian despots might reply: Well, we have managed all these centuries without such qualities, why do we need them now? At best, they might choose to treat other nations the same way that ants utilize aphids, alternatively, they might conclude that potential rivals were more trouble than they were worth and decide that the planet would be better off without them. And in a world where those who ruled China could more or less do as they pleased, is it not possible that something of the contempt for life implied by Mao's comment to Khrushchev in 1957 that he did not mind losing 300,000,000 people in a nuclear war with the US, since they could easily make up the numbers (Johnson, 1983, 546), might well persist? Mao, of course, was an extreme Communist totalitarian despot, but recent news coming out of The People's Republic of China does not indicate that such insensitivity has yet been abandoned. Taiwan is different, but Beijing still seeks to deprive the inhabitants of Taiwan of their autonomy and reabsorb them into its sphere of control.

Possibly the rise of a totalitarian eugenics-oriented China, as prophesied by Lynn, might well be the sort of challenge to which Americans have always risen and thus lead to a consensus on how to deal with the economic and dysgenic problems which beset their own country. Can China pursue dreams of world domination via eugenics without arousing a sense of danger in the West until it is too late for the West to be capable of responding? Or will this potentially eugenic Sparta succumb to the temptations of power too early, thus alerting the West in time?

As a start, it is remotely possible but highly unlikely that an American government would return to color-blind, market-driven, hiring and firing policies. The effects of repealing burdensome egalitarian and affirmative action legislation would be felt way beyond America's borders. By inflicting huge tax and legislative burdens on its own industrial and commercial

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enterprises, backed by punitive sanctions for non-compliance, America does its European, Chinese and Japanese rivals a huge favor. Liberated from these burdens, America would experience an explosion of entrepreneurial energy. Similarly, European economies would have to abandon their own restrictive welfare and protective business practices in order to compete.

If, however, too many years of prosperity and comfort have destroyed America's ability to confront problems with that famous will-to-win when roused from complacency, then the destiny of both America and Europe might well be to become vassals to Lynn's eugenically-improved, highly intelligent, burgeoning Chinese population, organized in keeping with its own historical traditions under a totalitarian government. Dwarfed in ability, and possibly even in sheer numbers, a more moribund, multicultural West might find itself unable, and perhaps even unwilling, to even attempt to challenge worldwide hegemony, and we would then see to what extent intelligence is a guarantor of beneficent social and political policies. I concede that a high level of culture requires a correspondingly high level of intelligence; but culture is a very complicated affair, with deep roots in human nature and in the history of peoples and nations. I envy Lynn his optimism, but regret that I cannot share it without serious reservations.

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Will China Become the Next Hegemonic Superpower?

Richard Lynn
University of Ulster

The authors agrees with Ellis's comment that the Chinese have shown less creative achievement than Europeans during the last five centuries, but argues that over a longer time span Oriental achievements have matched those of Europeans and that if they were to embark on a eugenic program they could surpass Caucasoids. He also accepts Ellis's second point that if and when the Chinese secure world hegemony they might well repopulate the remainder of the world.

Key Words: China, eugenics, migration, technological progress

Frank Ellis raises two important questions concerning the thesis set out in my *Eugenics* that at some point in the future China will overtake the West economically and militarily, will become the leading world superpower and will colonize the entire world. First, he expresses doubts about whether the Chinese have the abilities to accomplish this. Second, granted for the sake of argument that the Chinese are able to do this, he doubts whether they would use their power to govern their subject peoples in the benevolent way that the Romans and the British did when they ruled their empires. I will discuss each of these points in turn.

As regards the question of whether the Chinese have the abilities to coerce the West into submission by developing superior advanced weapons technologies, Ellis argues that although the Chinese (together with the Japanese, the other major Oriental people) have the high IQ to enable them to do this, they appear to lack the creativity necessary for innovative scientific achievements. In response to this, it is certainly true that since the Renaissance the European peoples have far surpassed the Oriental peoples in creative scientific and technological achievement. However, before this the Chinese scientific and technological achievements were at least as impressive as those of Europeans and arguably superior. According to David Landes "the Chinese were well ahead of anyone else – and certainly of Europe" (Landes, 1998, p.342). For instance, in astronomy the first recorded observations of

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stars, planets, constellations and comets were made in China around 2300 B.C. It was not until around 2,000 years later than comparable observations were made in Greece. Haley's comet was recorded by Chinese astronomers in 240 B.C. and again in 1066 A.D., but it was not known in Europe until 1450 when it was discovered by the German astronomer Johan Muller and again in 1607, when it was recorded by the English astronomer Thomas Herriot. In A.D. 185 Chinese astronomers were the first to record a supernova explosion. In 365 A.D. they discovered the moons of Jupiter, which were not known in Europe until they were discovered independently by the German astronomer Simon Marius in 1609 and by Galileo in 1610.

In agricultural technology, the Chinese were the first to invent the collar and harness for horses about 250 B.C. In 80 A.D. they invented the chain pump for lifting water for irrigation, winnowing machines and multi-tube seed drills. In 240 A.D. they invented the wheel barrow, which did not appear in Europe until 1250. In 530 the Chinese invented a water-powered mill for shaking and sifting flower.

In printing and paper technology, the production of paper from bark and rags was developed in China about the year A.D. 105 by Tsai Lun; paper was not produced in the West until 790, when it began to be made in Iraq. Printing from engraved wooded blocks was invented in China about 650 A.D. The technology spread to Japan where the first printed text was produced in 767. In China the first printed book (a Buddhist scripture) was produced in 868. About 1040, the Chinese developed movable type, made of ceramic, for printing, and in 1100 color printing was invented in China for printing paper money. In Europe, printing was first developed in Germany about 1440 by Johannes Gutenberg and printed paper money was not introduced until the nineteenth century.

In mathematics the abacus was invented independently by the Chinese and the Babylonians about 3000 B.C. It was introduced into Europe about 950 A.D. The Chinese invented the decimal point about 1350 B.C. and negative numbers in 100 B.C.

There has emerged some degree of consensus among scholars that the major factor responsible for the stagnation of China from around the year 1500 is that the Chinese failed to develop a market economy of the kind that evolved in Europe.

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This is the principal reason why Europe and later the United States assumed the lead in economic, scientific and technological development. This is the conclusion reached by the European historian Etienne Balazs: "Chinese society was highly authoritarian ... There was a whole array of state monopolies, which comprise the great consumption staples: salt, iron, tea, alcohol and foreign trade ... there were clothing regulations, a regulation of public and private construction of the dimensions of houses... it was the state that killed technological progess in China (Balazs, 1968, pp. 22-3). The same conclusion has been reached by the American historian Landes: "I would stress the market. Enterprise was free in Europe. Innovation worked and paid, and rulers and vested interests were limited in their ability to prevent or discourage innovation" (Landes, 1998, p. 59). The reason that Europe developed a market economy is probably that it consisted of a large number of independent and competing states, in some of which market institutions were able to evolve, were seen to be effective, and were adopted by others, whereas China was a single state whose rulers were able to impose state controls over the whole of the economy. The German sociologists Erich Weede and Sebastian Kampf (2002) put the same point slightly differently when they argue that in Europe rulers were obliged to allow property rights and free economies and these created the conditions for scientific and technological advances.

The high abilities of the Chinese and Japanese once again became evident towards the end of the twentieth century when several of them were awarded Nobel prizes in Physics and Chemistry. This and the historical achievements of these peoples tells us that the genes for the highest level of scientific and technological achievement are present in the Orientals, even though these may be less frequent than in Caucasians.

This is where a eugenic program would likely be used by the Chinese to produce greater numbers of brilliant scientists able to produce advanced weapons systems. As few as half a dozen outstanding scientists would be sufficient for this purpose. They could be cloned to produce thousands of replicas or used for artificial insemination to produce thousands of gifted children.

It anticipating the ultimate triumph of China in the emerging contest for world supremacy we have to take account of the inevitable decline in the power of the West as a result of

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the mass immigration of non-Europeans. In the United States, whites will become a minority in the second half of the twenty first century. The majority will be Hispanics and blacks. The United States will then become just another third class Latin American power. The same thing will happen in Europe a few decades later as the European peoples become outnumbered by south Asian and African immigrants. As the United States and Europe decline, China will inevitably emerge as the hegemonic power.

Turning now to Ellis's second point regarding whether once China has secured world domination it will be likely to rule the world in the benevolent way that previous world powers have ruled subject peoples, such as the British, French and Romans. Ellis calls this an optimistic scenario. He does not spell out the pessimistic alternative, but we can assume that he means that the Chinese will in the course of time repopulate the continents with people of their own race. This is certainly a plausible scenario. Although it can be said that the British ruled their colonies in Africa and the Indian sub-continent in a benevolent way, the same cannot be said for their treatment of the Native American Indians and Australian Aborigines, large numbers of whom were killed (or died from imported diseases, especially measles, but the results were the same). Their best lands were taken over by Europeans and the remnants of their population were driven into less hospitable regions where their numbers declined even further. China is already moving Chinese into Tibet and Xinjiang, to the detriment of the indigenous non-Chinese populations, and it is an entirely plausible possibility that this will be the ultimate fate of the Europeans and other races when China secures world domination.

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Intraspecific Variation in Gene Expression Patterns in the Brains of *Homo Sapiens*: Implications of Paabo's Findings for Group Cognitive Differences

John Foster[1]
John Foster and Associates

It had been suggested that an apparent contradiction posed by the very similar genomes of humans and chimpanzees and the marked morphological and cognitive differences between these two species, might be resolved by differences in the rates of expression of identical genes. Now, research reported in *Science* from The Max-Planck Institute for Evolutionary Anthropology at Leipzig, using gene array technology, shows substantial differences in the rates of genetic expression found in the brains of humans and chimps at autopsy. Individual differences in rates of genetic expression were also reported among brains of human subjects. It has long been necessary to resolve the contrast between the very similar genomes and the well-documented cognitive differences found among regionally identified human populations. Are there group average differences in rates of brain genetic expression related to cognitive differences among human populations? This question would appear to be researchable using the methodology reported from Leipzig.

Key Words: Affymetrix arrays, gene expression rates, cognitive differences

It has been understood since the work of King and Wilson in 1975 that the genomes of humans and chimpanzees are virtually identical having an approximate overlap in kind and number of genes of nearly 99% (King & Wilson, 1975). This left evolutionary scientists with the perplexing problem of explaining the very great anatomical, behavioral, and cognitive differences between these two preeminent primate species. It had been proposed that these differences arose from major variation in the expression of those otherwise very similar genes; that this involved the kind and location of genes expressed and the rate at which they were being expressed (Gibbons, 1998). Now research reported by Svante Paabo and co-workers at the Max-Planck Institute for Evolutionary Anthropology at Leipzig

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reports experimental evidence showing distinct differences in the rate of gene expression between brain tissues from humans and chimpanzees (Enard, et al., 2002,-Pennisi, 2002). These investigators used Affymetrix arrays to assay the relative quantities of mRNAs expressed from some 12000 human genes in brain tissue samples. They also compared protein expression rates from brain tissue samples in both species. They thereby demonstrated a substantially elevated rate of gene expression in human brains over and above the rate of gene expression in the brains of chimpanzees. It is clear from their findings that in the course of recent evolution, humans have evolved rates of genetic expression in brain tissue very different and very much faster than that which may be found in chimps. The authors note that "the underlying reasons for such expression differences are likely to be manifold, for example, duplications and deletions of genes, promotor changes, changes in levels of transcription factors, and changes 'in cellular composition of tissues (Enard, et al. 2002) Forthcoming inquiry by Paabo's group, will no doubt, be to identify specific genes with accelerated expression in human brain, and elucidate their functional significance(Pennisi, 2002).

Another long standing and perplexing problem, of concern to evolutionary scientists, is to explain the well-documented morphological, behavioral and cognitive differences found among the various regionally identified human populations (Jensen, 1969; Rushton, 1995). It is clear from the work of Paabo's group that there are substantial 'individual differences in the gene expression rates found among the brains of their small sample of human subjects. "The results show that the variation in gene expression between individuals within the species is substantial." (Enard, et al., 2002). The above findings suggest the questions: are there significant group average differences in the rates of genetic expression in brain tissues from regionally identified populations analogous to the differences observed between humans and chimpanzees and might such differences, should they exist, be relevant to the group cognitive differences which have long perplexed evolutionary scientists? This issue would appear to be researchable. Brain tissue could be recovered, in a standardized manner, from a large sample of subjects at autopsy and assayed for gene expression rate in the manner of Paabo's group above.

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The findings could then be studied in relation to the educational records, IQ test records, regional identity, and any other social parameter of interest for which data may be available regarding the deceased subjects.

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Book Review

Biology at Work:
Rethinking Sexual Equality
Kingsley R. Browne
Rutgers University Press, 2002

Rutgers University has historically been regarded a center for egalitarian bias in matters relating to human individuals and human society. But while so many university presses routinely turn out uninspiring and repetitive studies which serve only to reinforce egalitarian philosophies, it is encouraging to find Rutgers University Press producing a truly significant book supporting realistic attitudes relating to heredity in the field of social science. Feminism and "anti-racist" interpretations of human behavior have striven hard to suppress any recognition of the relevance of biology to anthropological, sociological, and even economic research, but with the publication of *Biology at Work* we see the walls of egalitarian bias beginning to crumble. Following in the footsteps of Professor Glenn Wilson, of the University of London's *Great Sex Divide,*[1] author Kingsley R. Browne here shows the relevance of heredity to explain male/female differences in the workplace. How soon will it be before other courageous researchers and university presses dare to investigate the role of inherited race differences in explaining equally significant differences in individual achievement in the work place and indeed in society generally?

Thus, opening the pages of this remarkable book, we find the author stating that:

> "Rather than identifying women as the 'victims' of current arrangements, one could as easily argue that it is men who are disadvantaged. Men are expected to work whether or not their wives 'choose' to. Their biologically predisposed competitiveness and status-seeking can be as much a straitjacket as women's biologically ordained role as incubators of children, and they often lead men to an early grave. This is not to suggest that the mantle of victimhood should be lifted from women and conferred on men. What needs to be questioned is the

[1] *The Great Sex Divide,* Glenn Wilson, Washington D.C.: Scott-Townsend Publishers.

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> notion that either sex is a victim. Once one accepts that men and women have, on average, different predispositions, desires, and definitions of success, it is axiomatic that comparisons between the two groups will yield qualitatively different outcomes for the two groups."

Biology at Work reveals how biology helps explain why women, on average, earn less money than men, and argues that there is an evolutionary basis for the scarcity of female CEOs in Fortune 500 companies. Browne brings an evolutionary perspective to bear on issues of women in the workplace: the "glass ceiling," the "gender gap" in pay, sexual harassment, and occupational segregation. While acknowledging the role of discrimination and sexist socialization, Browne suggests that until we factor real biological differences between men and women into the equation, the explanation remains incomplete.

Browne looks at behavioral differences between men and women as products of different evolutionary pressures facing them throughout human history. Women's biological investment in their offspring has led them to be on average more nurturing and risk averse, and to value relationships over competition. Men have been historically and biologically rewarded for displays of strength and skill, risk taking, and status acquisition. These behavioral differences have numerous workplace consequences. For example, sex differences in the drive for status lead to sex differences in the achievement of status.

Browne argues that decision-makers should recognize that policies based on the assumption of a single androgynous human nature are unlikely to be successful. Simply removing barriers to inequality will not achieve equality, as women and men typically value different things in the workplace and will make different workplace choices based on their different preferences.

Rather than simply putting forward the "nature" side of the debate, Browne suggests that ideologically-oriented debates on dichotomies such as nature/nurture have impeded understandings of the origins of human behavior. Through evolutionary biology we can understand not only how natural selection has created predispositions toward

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certain types of behavior but also how the social environment interacts with these predispositions to produce observed behavioral patterns.

We look forward with anticipation to future studies of this kind which will dare to investigate the role of biology in determining ethnic disparities in educational and economic achievement, and in kinds of criminal activity ranging from "white collar" to rape and murder. Rutgers University Press has more than adequately met the demands of prevailing political ideology with its many publications on such subjects as Gay and Lesbian studies, so that it can well afford to publish more objective studies such as this in its important *Series in Human Evolution.*

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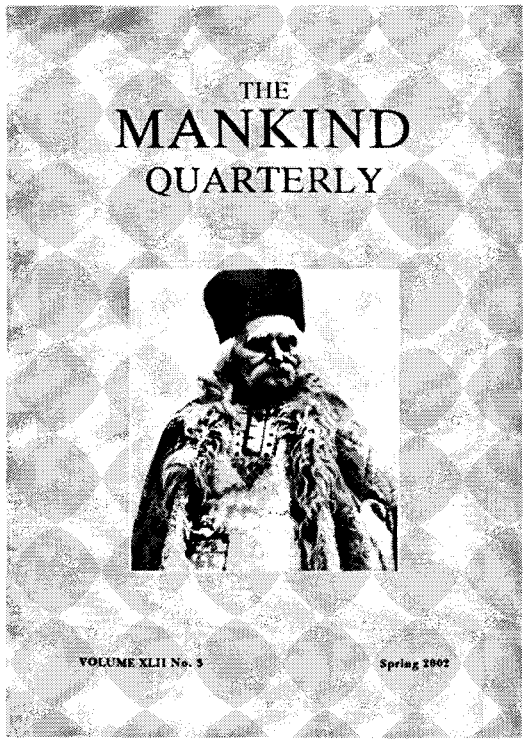

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